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BIOLOGIA CENTRALI-AMERICANA.

ARACHNIDA

SCORPIONES, PEDIPALPI, AND SOLIFUGÆ.

BY

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ZOOLOGIA.

Class ARACHNIDA.

Order SCORPIONES.

Key to the Families of Central-American Scorpions.

a. Legs furnished with a single pedal spur on the anterior side of the arthrodial membrane connecting the tarsus and protarsus. Sternum pentagonal; the two halves of the genital operculum united in the female	Scorpionidæ.
a^1. No subaculear tooth on caudal vesicle	Subfam. Ischnurinæ.
b^1. A distinct subaculear tooth on the caudal vesicle	Subfam. Diplocentrinæ.
b. Legs with a pair of pedal spurs between the tarsus and protarsus; the two halves of the genital operculum separated in both sexes.	
a^2. Sternum with parallel or subparallel sides, pentagonal; the pedal spurs simple, unbranched; immovable finger of mandible without an inferior tooth	Væjovidæ.
b^2. Sternum triangular, with anteriorly converging sides; anterior pedal spur bifid; immovable finger of mandible with one inferior tooth	Buthidæ.

Fam. SCORPIONIDÆ.

Subfam. *ISCHNURINÆ*.

OPISTHACANTHUS.

Opisthacanthus, Peters, MB. Ak. Wiss. Berlin, 1861, p. 511; Thorell, Ann. & Mag. Nat. Hist. (4) xvii. p. 11 (1876); Pocock, Journ. Linn. Soc., Zool. xxiv. p. 397 (1893); Ann. & Mag. Nat. Hist. (6) xvii. p. 312 (1896); Kraepelin, Jahrb. Hamb. Wiss. Anst. xi. p. 118 (1894) (part.); Das Tierr., Scorpiones et Pedipalpi, p. 146 (1899).

Opisthocentrus, Pocock, Ann. & Mag. Nat. Hist. (6) xii. p. 316 (1893).

Carapace deeply excised anteriorly, longitudinally sulcate throughout; ocular tubercle subcentral; three lateral eyes on each side. *Tail* thin, compressed, rather short. *Chelæ* robust, the brachium armed at the base in front with a large tooth-like prominence; upperside of the hand divided by a strong crest into two areas, the external of which is nearly vertical and meets the internal horizontal area at an obtuse or a right angle, the vertical area separated by a strong keel from the underhand, which is completely

inferior and constitutes the external area of the lower surface of the hand; movable finger furnished with two rows of fine teeth extending from the base to the apex. *Tarsi* furnished beneath with two rows of spines. *Pectines* short, the shaft broad at the base owing to the width of the intermediate lamella.
Type *O. lepturus*, Pal. de Beauv. (*Scorpio*).

Distribution. Northern parts of the Neotropical Region. Tropical Africa. Madagascar.

The African and Madagascar species referred to this genus differ in certain structural points from the one known Neotropical form, and have been separated as a distinct genus named *Opisthocentrus*, which will probably have to be maintained.

1. **Opisthacanthus lepturus.** (Tab. I. figg. 1, 1 *a–g*, ♂ ♀.)

Scorpio lepturus, Pal. de Beauv. Ins. Afr. et Amér. p. 191, Apt. t. 5. fig. 4 (1805) [1].
Scorpio elatus, Gervais, Arch. Mus. iv. p. 235, t. 12. figs. 46–49 (1844) [2]; Ins. Apt. iii. p. 69 (1844) [3].
Opisthacanthus elatus, Peters, MB. Ak. Wiss. Berlin, 1861, p. 511 [4]; Pocock, Journ. Linn. Soc., Zool. xxiv. p. 398 (1893) [5]; Ann. & Mag. Nat. Hist. (6) xii. p. 330, t. 14. figg. 2, 2 *a* (1893) [6]; Kraepelin, Jahrb. Hamb. Wiss. Anst. xi. p. 120 (1894) [7]; Das Tierr., Scorpiones et Pedipalpi, p. 148 (1899) [8]; Borelli, Boll. Mus. Torino, xiv. no. 338, p. 3 (1899) [9].
Dacurus galbineus, Peters, MB. Ak. Wiss. Berl. 1861, p. 511 [10].
Opisthacanthus kinbergi, Thorell, Atti Soc. Ital. Sci. Nat. xix. p. 246 (1877) [11].

♀. *Colour* a tolerably uniform deep brown, the abdomen often pale brown; legs deep brown, with yellow tarsi, ventral surface yellowish-brown. *Carapace* granular, a little longer than caudal segments $1+2+\frac{1}{2}$ of 3. *Terga* also granular and rugose, the last not carinate, but furnished posteriorly with two small tubercles. *Sterna* smooth, the last subsulcate. *Tail* about two and a half times as long as the carapace; the segments mesially excavated above, with rounded smooth edges, subcarinate beneath, but granular only posteriorly, fifth segment denticulate beneath, vesicle smooth, with long hairs beneath the aculeus. *Chelæ*: humerus finely granular above, with tubercular keels; brachium with strong denticulated crest at the proximal end of its anterior surface; hand coarsely granular above, rugose beneath, denticulated in front; the underhand about as long as the movable finger and as the carapace, width of hand about two-thirds the length of the underhand, fingers in contact throughout, not lobate. *Legs* finely granular, the femora coarsely granular below; tarsi armed below with 2 anterior and 4–5 posterior spines. *Pectines* small, furnished with 4–7 teeth.

♂. Tail a little more than three times the length of the carapace. Base of the fingers lobate and sinuate. Pectines large and furnished with 9–14 teeth.

Measurements in mm.— ♀. Total length 78, carapace 12, tail 33. ♂. Total length 69, carapace 10, tail 31.

Hab. Panama, Rio Cianate, Punta de Sabana, Rio Lara, Laguna de Pita and Tintin in Darien (*Festa* [9]), San José in the Pearl Is. [11].—Colombia.

Recorded from the Isthmus of Panama by Dr. Borelli, who has kindly submitted specimens to me for examination. The species possibly occurs in Haiti.

Subfam. *DIPLOCENTRINÆ.*

DIPLOCENTRUS.

Diplocentrus, Peters, MB. Ak. Wiss. Berlin, 1861, p. 512 [1]; Thorell, Ann. & Mag. Nat. Hist. (4) xvii. p. 12 (1876) [2]; Pocock, Journ. Linn. Soc., Zool. xxiv. p. 393 (1893) [3]; Kraepelin, Jahrb. Hamb. Wiss. Anst. xi. p. 12 (1894) [4]; Das Tierr., Scorpiones et Pedipalpi, p. 99 (1899) [5].

Carapace with its anterior border deeply excised in the middle, with rounded frontal lobes; three lateral eyes on each side; ocular tubercle in advance of its middle, not sulcate. *Mandible* with penultimate tooth of movable finger some distance behind the terminal fang. *Chelæ* robust, the fingers armed with a close-set median series of teeth, with a lateral series on each side consisting of more scattered denticles, some of which are enlarged. *Tarsi* armed beneath with two rows of spines. *Tail* with its fifth segment furnished beneath posteriorly with a semicircular area bounded by a row of granules, a distinct tubercular tooth beneath the aculeus.

Type *D. whitei*, Gervais.

Distribution. Texas, Mexico, West Indies, and Brazil.

1. **Diplocentrus whitei.** (Tab. I. figg. 2, 2 *a–f*, ♀; 3, 3 *a–d*, ♂.)

Scorpio whitei, Gervais, Ins. Apt. iii. p. 63 (1844) [1].

Diplocentrus whitei, Karsch, Mittheil. Münch. ent. Ver. iii. p. 98 (1879) [2]; Pocock, Journ. Linn. Soc., Zool. xxiv. p. 396 (1893) [3]; Ann. & Mag. Nat. Hist. (7) i. p. 391 (1898) [4]; Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 101 (1899) [5].

[Nec *D. whitei*, Kraepelin, Jahrb. Hamb. Wiss. Anst. xi. p. 13 (1894).]

Diplocentrus mexicanus, Peters, MB. Ak. Wiss. Berlin, 1861, p. 512 [6]; Karsch, Mittheil. Münch. ent. Ver. iii. p. 99 [7]; Zeitschr. Naturw. (3) v. p. 407 (1880) [8].

Diplocentrus antillensis, Kraepelin, Jahrb. Hamb. Wiss. Anst. xi. p. 16 (1894) [9] (nec *D. antillanus*, Pocock).

♀. *Colour* of trunk dark brown or greenish-brown; legs yellow-brown; hands and vesicle reddish. Upperside of trunk smooth and polished, with only a few granules upon the edge of the frontal lobes and upon the posterior border of the tergite laterally, the last tergite more granular at the sides, the granules forming two weak crests. *Carapace* a little longer than the first and second caudal segments, considerably longer than the fifth. *Sterna* smooth; the last with four abbreviated, posteriorly converging, weakly granular keels. *Tail* about three and a half times the length of the carapace; the intercarinal spaces smooth; superior and inferior lateral keels weak and weakly tubercular, becoming progressively weaker from the first to the fourth; median lateral keel extending over the posterior half of the segment of the second, complete on the first, represented by a few granules and punctures on the third; the four inferior keels strong and tubercular on segments 1–3, the median becoming progressively weaker on segments 1–3 and obsolete on the fourth, where they are represented by rows of punctures; fifth segment with strong and denticulated inferior keels, upper keels weakly tubercular; vesicle smooth and punctured, granular only quite at the base beneath; the subaculear tooth pointed or rounded and lobate. *Chelæ* mostly smooth and polished; crests on the humerus denticulated, the anterior strong and complete; upperside and upper crest of brachium smooth, its anterior surface finely granular; hand smooth and polished, weakly crested above, its inner edge denticulated, its inner surface with two weak denticulate crests, its width equal to the length of the underhand; movable finger considerably longer than carapace. *Legs* almost smooth externally; distal end of tarsus expanded and overlapping the base of the claws; tarsus of fourth armed beneath with 7 spines in front, 8 behind, the third with 5 and 7. *Pectinal teeth* 10–15.

♂. Smaller than female. *Carapace* finely shagreened in parts, terga also finely shagreened and furnished with a few coarse granules, especially along the posterior edge. *Tail* with inferior lateral keels on segments 1–3 parallel. *Chelæ* with upperside of humerus flat and anterior crest strong; brachium with reticulation of ridges; hand coarsely reticulated above, more finely below, furnished above with two crests, the external strong and running almost to base of immovable finger; area at base of immovable finger smooth, punctured, not depressed and granular; fingers curved as in female. Legs of third and fourth pairs with some coarse granules. Pectinal teeth 14.

Measurements in mm.— ♀. Total length 65, carapace 9, tail 32. ♂. Total length 53, carapace 7, tail 31.

Hab. North America, Texas.—Mexico.

No exact locality in Mexico has ever been assigned to specimens of this species.

The above-given description and the figures on Tab. I. have been taken from an adult male and female, captured with many others at San Diego, Texas, by Mr. William Taylor. The only other example in the British Museum is the type of the species, which is dried and too imperfect to be available for description. It is ticketed "Mexico."

D. mexicanus, Peters, is cited as a synonym of *D. whitei* on Kraepelin's authority.

2. **Diplocentrus keyserlingi.** (Tab. I. figg. 4, 4 *a–c*, ♂.)

Diplocentrus keyserlingii, Karsch, SB. Ges. nat. Fr. Berlin, 1880, p. 57 [1]; Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 102 (1899) [2].

Diplocentrus rectimanus, Pocock, Ann. & Mag. Nat. Hist. (7) i. p. 390 (1898) [3].

♂. Colour as in *D. whitei*. The whole of the upperside of the *trunk* finely and closely granular, with coarse granules or tubercles on the frontal lobes of the carapace. *Tail* as in the preceding species, but the sides of the first to the fourth segments convexly rounded when viewed from above, and the inferior lateral crests strongly converging posteriorly. *Chelæ* with upperside of femur lightly convex and with weaker anterior crest; hand coarsely sculptured above, with network of ridges and two strong parallel keels, running from but not reaching the base of the immovable finger; area at base of this finger hollowed and granular; fingers much straighter than in *D. whitei*. Tarsi of fourth *leg* armed beneath with 6 spines behind and 6 in front. *Pectinal teeth* 9–10.

Measurements in mm.—Total length 55, carapace 6, tail 30.

Hab. Mexico, Jalapa, Oaxaca.

The above-given description and the figures on Tab. I. have been taken from the type of *D. rectimanus*, which, according to Kraepelin, is synonymous with *D. keyserlingi*, Karsch. Only the male is known.

Fam. VÆJOVIDÆ.

Synopsis of the Genera.

a. Caudal segments 1–4 either keelless or furnished with a pair of parallel inferior keels.

  a[1]. A large spike-like tooth present upon the lower border of the movable finger of the mandible . . . . . Hadrurus, Thorell.

  b[1]. Lower border of movable finger of mandible either toothless or armed with a few small subequal teeth.

    a[2]. Intermediate lamellæ of the pectines broken up into numerous subequal subsimilar sclerites, of which about eight in the distal half of the organ are spherical and like the fulcra, which are large and round; no teeth on inferior edge of movable finger of mandible; stigmata long and slit-like . . . . . Væjovis, C. Koch.

    b[2]. Intermediate lamellæ of the pectines not broken up into subequal subspherical sclerites, or when broken up in this manner only about six in number, and then the movable finger of the mandible is furnished with a row of five teeth below, and the stigmata are short and suboval; fulcra of pectines not large, triangular.

a^3. Three lateral eyes on each side; lower surface of tail keeled; tarsi furnished beneath with a median row of short spicules.

a^4. Intermediate lamellæ of the pectines not broken up into subequal sclerites; stigmata long, slit-like . . . . . ANUROCTONUS, Pocock.

b^4. Intermediate lamellæ of the pectines distally broken up into about six subsimilar sclerites; stigmata short, suboval . . . . . UROCTONUS, Thorell.

b^3. Two lateral eyes on each side; lower surface of caudal segments 1–4 keelless (in the Central-American species); tarsi without median row of spicules; stigmata oval . . . . BROTEOCHACTAS, Pocock.

b. Caudal segments furnished with a single inferior median keel; two lateral eyes; two rows of small teeth on the fingers of the chelæ.

a^5. Pectines with distinct fulcra; stigmata elongate, slit-like . . . PLESIOCHACTAS, Pocock.

b^5. Pectines without distinct fulcra; stigmata short, crescentic . . MEGACORMUS, Karsch.

HADRURUS.

Hadrurus, Thorell, Ann. & Mag. Nat. Hist. (4) xvii. p. 11 (1876); Atti Soc. Ital. Sci. Nat. xix. p. 189 (1877) (part.); Karsch, Mittheil. Münch. ent. Ver. iii. p. 21 (1879) (part.); Pocock, Ann. & Mag. Nat. Hist. (6) xii. p. 92 (1893); op. cit. p. 329 (sensu stricto); Kraepelin, Jahrb. Hamb. Wiss. Anst. xi. p. 206 (1894); Das Tierr., Scorpiones et Pedipalpi, p. 188 (1899).

Movable finger of *mandible* armed beneath with a strong and long tooth. *Tarsi* furnished below with a median row of spicules and paired lateral setæ; a large inferior claw present. *Pectines* long, with numerous spherical fulcra and the intermediate lamellæ represented, except basally, by a row of spherical sclerites. *Sternum* short and wide, deeply impressed mesially. *Stigmata* elongate. Fingers of *chelæ* furnished with 7–8 median rows of teeth, flanked on each side with isolated larger teeth. *Carapace* with convex anterior border; ocular tubercle in the middle. *Tail* long and strong.

Type *H. hirsutus*, Wood.

Distribution. South-western area of the United States and Mexico.

Synopsis of the Species.

a. Frontal area of carapace closely and finely granular; the tubercle very finely granular; the terga also very finely and closely granular, with some coarser granules interspersed upon the posterior elevated area; sterna finely and closely granular laterally, the last with four granular keels and additional granules in the middle of its area; median and lateral keels of fourth and fifth segments coarsely granular, superior lateral portions of fourth and fifth segments thickly and coarsely granular; hand and brachium finely and closely granular; upperside of hand with some coarse granules near the inner edge and many on the edge; coxæ of legs shagreened; movable finger longer than carapace . . . . . *hirsutus*, Wood.

b. Frontal area of carapace somewhat sparsely studded with large rounded granules, the intervening areas perfectly smooth, as is the ocular tubercle; terga mostly smooth in front and mesially; last sternum smooth in the

middle, with a single granular keel on each side; tail much smoother, median lateral crests on third and fourth segments scarcely granular; brachium and hand smooth and polished, except for the granules on the crests and a few coarse granules on the distal end of the upper surface of the brachium; hand with only a few rounded granules on the inner edge and on the keel above the underhand; coxæ of legs almost entirely smooth; movable finger shorter than carapace . . . . . *aztecus*, sp. n.

1. **Hadrurus hirsutus.** (Tab. II. figg. 2, 2 *a*, ♂.)

Buthus hirsutus, Wood, Proc. Ac. Philad. 1863, p. 108[1]; Journ. Ac. Philad. (2) v. p. 367, t. 40. figg. 1, 1 *a–c* (1863)[2].

Hadrurus hirsutus, Thorell, Ann. & Mag. Nat. Hist. (4) xvii. p. 11 (1876)[3]; Atti Soc. Ital. Sci. Nat. xix. p. 189 (1877)[4]; Bull. Soc. Ent. Ital. xxv. p. 373 (1895)[5]; Karsch, Mittheil. Münch. ent. Ver. iii. p. 136 (1879)[6]; Marx, Proc. Ent. Soc. Wash. i. p. 91 (1888)[7]; Kraepelin, Jahrb. Hamb. Wiss. Anst. xi. p. 205 (1894)[8]; Das Tierr., Scorpiones et Pedipalpi, p. 188 (1899)[9].

Buthus emarginaticeps, Wood, Proc. Ac. Philad. 1863, p. 109[10]; Journ. Ac. Philad. (2) v. p. 367, t. 40. fig. 4 (1863)[11] (teste Marx, Proc. Ent. Soc. Wash. i. p. 91).

Hab. North America, San Bernardino in California[2], La Paz in Lower California[11], Arizona.—? Guatemala.

This species, recorded from Guatemala by Thorell, was originally discovered in California. The Berlin Museum has an example from La Paz, and the British Museum one from San Bernardino. Kraepelin also states that it occurs in Arizona. The specimen Thorell records from Guatemala was received from Dr. Gustav Eisen, of San Francisco, California. Hence it is permissible to doubt the authenticity of the locality, especially in view of the fact that two other well-known Californian species, namely *Uroctonus mordax* and *Anuroctonus phæodactylus*, were received from the same source and labelled "Guatemala."

Judging from the three specimens in the British Museum that I refer to this species, namely, the one from San Bernardino mentioned above and two smaller examples for which no locality is known, *H. hirsutus* may be easily distinguished from *H. aztecus* by the features pointed out in the synoptical table. These specimens agree tolerably closely with the examples which Thorell described with much minuteness in 1877. Wood's description is not all that can be desired, and Kraepelin's is too generalized to be satisfactory; but in some respects it does not fit the Californian specimen known to me, *e. g.* in the smoothness of the first four tail-segments and of the sterna. In these two characteristics, however, it agrees more closely with the two smaller unlocalized specimens in the British Museum, which, judging by the size of the San Bernardino example (97 mm.) and those seen by Wood (which reached 108 mm.), are not adult. They measure 75 mm.: Kraepelin gives 70 mm. as the maximum of the species, over-

looking Wood's statement on this point. Hence it seems likely that the smoothness of the organ referred to may be a sign of immaturity or characteristic of the female.

The pectinal teeth in *H. hirsutus* vary from 25 to 40, the usual number being about 32–35.

The characters of *H. hirsutus* given in the synoptical table are taken from the adult example from San Bernardino, which, from the size of the pectines, I regard as a male. For a similar reason the type of *H. aztecus* is assigned to that sex.

The San Bernardino example gives the following measurements:—Total length 97 mm., carapace 11·5, tail 63; width of vesicle 6, of brachium 4, of hand 5; length of finger 12·5. The pectines surpass the end of the coxa of the fourth leg when lying at rest, and bear 34–35 teeth. A smaller specimen, with the pectines falling short of the end of the coxa of the fourth leg and bearing 32 teeth, measures as follows:—Total length 75 mm., carapace 9·5, tail 64; width of brachium 3·2, of hand 4·2; length of movable finger 10.

It is noticeable that the hand in the San Bernardino example is much narrower than in the type of *H. aztecus*.

2. **Hadrurus aztecus,** sp. n. (Tab. II. figg. 1, 1 *a–f*, ♂.)

♀. *Colour*: upperside of trunk a rich reddish-brown, part of carapace and tail much paler; chelæ and legs clear ochre-yellow. *Carapace* as long as fifth caudal segment and as the first caudal segment, and more than half the second; the frontal area sparsely but coarsely granular; posterior and lateral portions much more thickly granular. *Terga* granular posteriorly and laterally, the anterior nearly smooth in the middle, the last granular throughout, with median crest. *Sterna* coriaceous, the last smooth and keelless on the middle, granular laterally, with a series of granules forming a single crest on each side. *Tail* nearly five times as long as the carapace, the fifth segment very slightly more than twice as long as wide, the first as long as wide; a few granules on the upperside of the segments; the lower side of segments 1–3 smooth, with smooth keels, those on the third only weakly granular posteriorly, on the fourth more strongly granular; superior and superior lateral keels granular; a median lateral keel, anteriorly abbreviated on segments 2–4, present on segments 1–4; fifth segment with superior crests strongly granular; the three inferior crests strong and denticulate, the intervening area coarsely but not closely granular; vesicle large, as wide as high, its width equal to that of the fifth segment and to half the length of the carapace, sparsely granular below and bristly, narrower than hand. *Chelæ* bristly; humerus with granular crests, and a few granules in front, elsewhere smooth; brachium with granular crests and a few granules above distally, elsewhere smooth or nearly so and polished; hand wide, polished and smooth except for a granular crest on its inner edge and one above the underhand, its width equal to the length of the underhand, more than half the length of the carapace, and far exceeding the width of the brachium; movable finger almost as long as carapace, about twice the length of the underhand, not lobate, and furnished with eight rows of teeth. *Legs* smooth, except the femora, which are finely granular externally and denticulate below; protarsus furnished externally with a comb of fine spicules. *Pectinal teeth* 35–37.

Measurements in mm.—Total length 103; carapace 13; tail 63, width of first segment 7, of fifth 6; height of vesicle 5·5, width 6; length of brachium 10·5, width 4; width of hand 7; length of underhand 6·5, of movable finger 12·5.

Hab. Mexico, Jalapa (*Mus. Brit.*).

VÆJOVIS.

Væjovis, C. L. Koch, Die Arachn. iii. p. 51 (1836).

Vejovis, Thorell, Ann. & Mag. Nat. Hist. (4) xvii. p. 10 (1876); Kraepelin, Jahrb. Hamb. Wiss. Anst. xi. p. 198 (1894); Das Tierr., Scorpiones et Pedipalpi, p. 183 (1899).

Carapace with its anterior border not excised; three lateral eyes on each side; ocular tubercle in front of its middle. *Mandible* without teeth on the lower border of the movable finger. *Chelæ* with fingers furnished with a median row of teeth flanked by a few larger lateral teeth. *Sternum* wider than long, longer than in *Hadrurus*. *Pectines* with intermediate lamellæ broken up, at least in the distal half of the organ, into subsimilar subequal and spherical sclerites simulating the fulcra, which are also large and spherical. *Tarsi* furnished beneath with a median row of spicules and lateral bristles. *Stigmata* long and slit-like.

Type *V. mexicanus*, Koch.

Distribution. Southern States of North America; Central America.

Synopsis of the Species known to me.

a. Inferior median keels on segments 1–4 or 2–4 well developed and granular.

*a*¹. Inferior and lateral intercarinal spaces of tail coarsely and thickly granular; tail short and thick, segment 3 much wider than long . . . . . *granulatus*, Pocock.

*b*¹. Inferior and lateral intercarinal spaces of tail smooth or at most weakly granular; third segment not wider than long.

*a*². Ventral surface of trunk and pectines marbled with black; small, up to 25 mm. long; pectinal teeth 11–12 . . . . . *pusillus*, Pocock.

*b*². Ventral surface of trunk and pectines not marbled with black; length of adult from 30–45 mm.; pectinal teeth 13–23 . . . . *mexicanus*, C. Koch.

b. Inferior median keels on segments 1–4 quite smooth or absent.

*a*³. Inferior median keels on segments 2–4 present as upstanding ridges.

*a*⁴. Trunk banded black and yellow; hand and vesicle smooth . . . *subcristatus*, Pocock.

*b*⁴. Trunk uniformly brown; hand and vesicle granular in part . . . *cristimanus*, Pocock.

*b*³. Inferior median keels on segments 2–4 obsolete.

*a*⁵. Hand granular internally; movable finger longer than carapace, which equals the brachium or humerus in length . . . . . *nitidulus*, C. Koch.

*b*⁵. Hand entirely smooth; carapace much longer than humerus, brachium, or movable finger.

*a*⁶. Terga ornamented behind with six pale spots separating seven black lines; ♂ with upper surface of humerus coarsely granular; sides and lower surface of fourth and fifth caudal segments finely granular . . . . . *variegatus*, Pocock.

*b*⁶. Terga ornamented posteriorly with three pale spots separating four dark lines; ♂ with upper surface of humerus not coarsely granular; lateral surface of fourth and fifth and lower surface of fourth caudal segments smooth . . . . . *punctatus*, Karsch.

1. **Væjovis mexicanus.** (Tab. II. figg. 3, 3 *a–c*, ♂.)

Væjovis mexicanus, C. Koch, Die Arachn. iii. p. 51, fig. 206 (1836) [1]; Pocock, Ann. & Mag. Nat. Hist. (7) i. p. 400 (1898) [2].

Vejovis mexicanus, Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 185 (1899) [3] (in part. and synon. excluded).

♀. *Colour*: upperside of trunk, upper and under sides of tail, and chelæ a tolerably uniform deep brown, without definite pattern of pale markings; legs and underside of the trunk paler yellowish-brown. *Carapace* somewhat coarsely granular, with symmetrically arranged smooth or almost smooth paler brown patches, especially on its lateral slopes; about as long as first and second caudal segments, shorter than the fifth. *Terga* without definite keels, more coarsely granular posteriorly than anteriorly; seventh with four strongly granular keels. *Sterna* smooth, with a few coarse punctures; the last finely granular at the sides and with one granular keel on each side. *Tail* about four and a half times as long as carapace, almost parallel-sided; the intercarinal space at most sparsely and finely granular, all the normal keels well developed and granular except the inferior medians of the first, which are weakly granular; median lateral keel strong on first, short on second and third segments; fifth segment with keel reaching the middle of its lateral surface; superior keels of segments 1–4, and superior lateral keels of segments 2–3, and in a lesser degree of 1, ending in a spine; second segment a trifle wider than long, third as long as wide, fourth considerably longer than wide, fifth twice as long as wide; vesicle almost smooth, subgranular laterally and at base. *Chelæ*: humerus and brachium at most finely granular above, upperside of brachium almost smooth; their surfaces bordered with granular keels; hand large, its width nearly as great as the length of the underhand, subcristate above and internally and distinctly granular internally; fingers in contact, movable about as long as the carapace and almost twice as long as width of hand; six teeth along the inner series. *Legs* with femora and patellæ, especially of third and fourth pairs, finely granular. *Pectinal teeth* 15–17.

♂. Smaller than female, *trunk* a little more coarsely granular and with *tail* slightly longer, being about five times as long as the carapace; third caudal segment as wide as long. *Hand* more strongly crested than in female, its width almost equal to the length of the underhand, and more than half the length of the movable finger. *Pectinal teeth* 18–20.

Measurements in mm.— ♀. Total length 45, carapace 5·5, tail 25·5. ♂. Total length 34, carapace 4, tail 21.

Hab. Mexico, neighbourhood of the city and Lake Chalco (*Mus. Brit.* [2]), Coyoacan, eight miles from Mexico city (*Howard Crosbie, in Mus. Brit.*).

Koch and Kraepelin give no exact locality for this species.

Subsp. *dugesi*, nov.

♀. Resembling the typical form, but with only 13 pectinal teeth and distinctly variegated on the trunk, limbs, and tail, the terga being ornamented with four black bands separating five pale bands; tail patched with black above, laterally, and below, the pigment on the lower side taking the form of spots round the base of the setæ; lower side of last abdominal sternum with six small spots, the other sterna very indistinctly spotted; similar spots upon the larger setal pores on the chelæ; hands lined with black, and black at base of fingers.

Total length 37 millim.

Hab. Mexico, Guanajuato, in the mountains (*A. Dugès*).

Subsp. *smithi*, nov.

♂. Resembling the male of the typical form in most characters, but with 22–23 pectinal teeth, variegated in colour much as in *V. mexicanus*, subsp. *dugesi*, but not so definitely spotted on the setiferous pores, and with the tail shorter; the carapace as long as caudal segments 1+2, and almost as long as 5, the hand narrower, its width less than half the length of the movable finger.

Measurements in mm.—Total length 30, carapace 4, tail 18.

Hab. Mexico, Cuernavaca 5200 feet (*H. H. Smith*).

2. **Væjovis granulatus.** (Tab. II. figg. 4, 4 *a*, *b*, ♀.)

Væjovis granulatus, Pocock, Ann. & Mag. Nat. Hist. (7) i. pp. 398, 399 (1898) [1].

Vejovis granulatus, Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 186 (1899) [2].

♀. Allied to *V. mexicanus* (typical form), but distinguishable by the following features:—*Colour* variegated black and yellow, terga with four black longitudinal bands; sterna spotted with black; maxillary processes of first and second legs infuscate; lower side of tail and vesicle spotted with black, sides of segments largely black on the posterior half; chelæ yellowish-brown with black mottling, hand black at base of fingers; legs mostly black, with yellow lines and spots. *Trunk* granular above, as in *V. mexicanus*. *Tail* shorter and thicker than in that species, about four times as long as the carapace, which is as long as its fifth segment; third segment much wider than long, fourth almost as wide as long, fifth about two-thirds as wide as long; dorsal, lateral, and inferior intercarinal spaces thickly and rather coarsely granular; vesicle granular throughout below. *Chelæ* as in *V. mexicanus*, but the hand thicker and fingers shorter, the width of the hand about two-thirds the length of the movable finger. *Pectinal teeth* 15.

Measurements in mm.—Total length 33, carapace 4, tail 17.

Hab. Mexico (*Patrick Geddes* [1], *in Mus. Brit.*).

3. **Væjovis pusillus.** (Tab. II. figg. 5, 5 *a–c*, ♂.)

Væjovis pusillus, Pocock, Ann. & Mag. Nat. Hist. (7) i. p. 399 (1898) [1].

Vejovis pusillus, Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 185 (1899) [2].

Belonging to the same category of species as *V. mexicanus* and *V. granulatus*, and approaching the latter in colour, the upperside of the trunk being densely marbled with black and reddish-brown; the tergites with a median, triangular, reddish patch, a >-shaped mark of the same colour, a submarginal yellow stripe, and a clear yellowish-red spot on each side of the middle line, the intervening black areas forming four black bands on the upperside of the trunk; tail coloured much as in *V. granulatus*, with a broad black stripe on each side of the middle line of the upperside of the segments, the two stripes sometimes meeting mesially; ventral surface of trunk, including the coxæ and pectines, thickly clouded with black; legs marbled from trochanter to tarsus; chelæ also marbled, hands lined with black, fingers indistinctly mottled. *Trunk* granular above, much as in *V. mexicanus*. *Tail* thin and short, about four times as long as carapace, which is longer than the first and second segments and as long as the fifth; third segment about as wide as long, fifth about twice as long as wide; lateral and inferior intercarinal spaces very finely and closely granular or coriaceous, also furnished with a few larger granules; vesicle granular below. *Chelæ* with crests much weaker and less coarsely granular than in *V. mexicanus*; the hand smooth, neither crested nor granular, narrower than in *V. mexicanus*, only a little wider than the brachium, its width barely half the length of the movable finger. *Pectinal teeth* 11–12.

Measurements in mm.—Total length 25, tail 13, carapace 3.

Hab. Mexico, Omilteme in Guerrero 7000 to 9000 feet, under rotten logs (*H. H. Smith*).

4. **Væjovis subcristatus.** (Tab. II. figg. 6, 6 *a*, *b*, ♂.)

Væjovis subcristatus, Pocock, Ann. & Mag. Nat. Hist. (7) i. p. 396 (1898) [1].

Vejovis subcristatus, Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 186 (1899) [2].

♂. *Colour* reddish-yellow; ocular tubercle black; tergites with a >-shaped black patch and a weakly-defined submarginal black patch; tail lined with black beneath. *Carapace* somewhat coarsely granular. *Terga* also furnished with coarse granules. *Sterna* smooth, the last with a smooth crest on each side. *Tail* long, at least five times as long as the carapace, which is shorter than the fifth and the first and second segments; the inferior and infero-lateral keels of segments 1–4 visible as distinct, smooth, punctured ridges, the laterals at most very slightly crenulate on segments 3 and 4; median lateral keel of first segment forming a weakly-crenulated ridge; lower surface of fifth sparsely granular; lateral intercarinal spaces of segments 1–4 practically smooth; vesicle smooth, punctured. *Chelæ*: upper surface of

brachium smooth, the posterior crest large but smooth; hand wide, its width about two-thirds the length of the movable finger, which is about as long as the fourth caudal segment; the two fingers sinuate, and not meeting at base when closed. *Pectinal teeth* 18.

♀. Resembling the male, but less granular, the anteocular area of *carapace* being nearly smooth; *tail* shorter, about four and a half times as long as the carapace; *hand* narrower, its width about half the length of the movable digit, the two fingers in contact at base when closed. *Pectinal teeth* 16–17.

Measurements in mm.— ♂. Total length 51·5, carapace 5·5, tail 31; width of hand 3. ♀. Total length 52, carapace 6, tail 29; width of hand 2·8.

Hab. Mexico, San Andres (? Tuxtla) (*coll. Keyserling, in Mus. Brit.* [1]), Jalapa (*Höge*).

At once distinguishable from *V. mexicanus* in having the four inferior caudal keels smooth, and also the hand in both sexes smooth and keelless.

5. **Væjovis cristimanus.** (Tab. III. figg. 1, 1 *a–d*, ♀.)

Væjovis cristimanus, Pocock, Ann. & Mag. Nat. Hist. (7) i. p. 397 (1898) [1].

Vejovis cristimanus, Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 186 (1899) [2].

♀. *Colour* a uniform reddish-brown, not variegated; legs yellow. Closely allied to *V. subcristatus*, but, apart from the difference in colour, distinguishable by having the *chelæ* more strongly crested, the posterior surface of the brachium being weakly granular and its inferior crest distinctly crenulate; the hand is also distinctly crested, the crests on its inner surface being granular. *Terga* visibly tricostate. Upper surface of fifth segment of *tail* with its superior lateral keels granular; vesicle granular below and more coarsely punctured than in *V. subcristatus*. *Pectinal teeth* 18–19.

Measurements in mm.—Total length 63, carapace 7·3, tail 36.

Hab. Mexico, Zacatecas (*Mus. Brit.* [1]).

6. **Væjovis variegatus.** (Tab. III. figg. 2, 2 *a–h*, ♀.)

Væjovis variegatus, Pocock, Ann. & Mag. Nat. Hist. (7) i. p. 394 (1898) [1].

Vejovis spinigerus, var. *variegata*, Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 187 (1899) [2].

♀. *Colour* reddish ochre-yellow or reddish-brown; carapace with black tubercle and irregularly-shaped but symmetrically-arranged black patches and stripes; tergites symmetrically marked, the median keel with a very narrow black stripe which sometimes expands in front and behind, on each side of this and separated from it by a narrow pale stripe there is a triangular black spot, the narrow anterior extremity of which extends forwards and often fuses with the anterior portion of the median stripe; the lateral portion of the terga with a narrow black edge and a yellow stripe separating it from a large black stripe extending from the anterior to the posterior border, and separated from the before-mentioned submedian triangular spot by a yellow stripe; this stripe is widened in front, but posteriorly it is narrower than the black patch to the right and left of it; tail clouded below and laterally with black and ornamented below with four black stripes; vesicle and upper surface of tail clear reddish-brown; chelæ reddish-brown, scarcely infuscate; legs with femora, patellæ, and tibiæ externally marbled with black. *Carapace* coarsely granular, its frontal area nearly smooth, as long as the first and second caudal segments, slightly shorter than the fifth. *Terga* coarsely granular, nearly smooth anteriorly. *Sterna* smooth, the last not keeled, and scarcely granular laterally. *Tail* more than four times as long as the carapace; third segment much wider than long, fourth almost as wide as long, fifth nearly twice as long as wide; the anterior segments granular above and laterally, smooth and symmetrically punctured below; fourth and fifth also smooth above and laterally; fourth smooth below and punctured, fifth thickly granular below, with three granular keels; superior and supero-lateral keels strongly developed, coarsely granular, dentate posteriorly, except the supero-lateral of the fourth; the inferior median keels obsolete on segments 1–4, the inferior laterals represented by a low, indistinct, smooth ridge; vesicle smooth, punctured below; median lateral

keel of fifth absent. *Chelæ*: humerus rather coarsely granular above and in front and finely granular below, with well-developed superior and anterior crests; brachium smooth above, the posterior crest of its upperside smooth, upper and lower anterior crests well developed and granular, with a few large granules above and below, smooth on its upper and posterior surfaces; hand entirely smooth, without crests, punctured, underhand about three-fourths the length of the movable digit. *Legs* with femora and patellæ finely granular externally. *Pectines* with 16–17 teeth.

♂. Smaller and much more coarsely granular than the female; third segment of *tail* as long as wide, fourth and fifth granular laterally, weakly and sparsely granular above, fourth also granular below, especially in its posterior half. Upperside of *humerus* coarsely granular; posterior crest of upperside of *brachium* crenulate; hand smooth, but grooved and subcostate above. *Pectinal teeth* 17–18.

Measurements in mm.—♀. Total length 45, carapace 5·5, tail 25. ♂. Total length 36, carapace 4·5, tail 23.

Hab. Mexico, Amula in Guerrero (*H. H. Smith* [1]).

7. Væjovis punctatus.

Væjovis punctatus, Karsch, Mittheil. Münch. ent. Ver. iii. p. 135 (1879) [1].

Væjovis nigropictus, Pocock, Ann. & Mag. Nat. Hist. (7) i. p. 395 (1898) [2].

Vejovis spinigerus, var. *punctata*, Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 187 (1899) [3].

♀. Nearly allied to the foregoing, but differing in the arrangements of the colour-bands on the tergites, the posterior half of the median keel being yellow, leaving a central pale spot, and on each side of this there is a black stripe which in front of the spot meets its fellow of the opposite side; lateral portion of the terga occupied by a large black patch, which extends to the lateral margin and is only indistinctly divided by a submarginal slightly paler band; between this patch and the submedian black band there is a broad yellow stripe, which posteriorly is twice as broad as the black spot that borders it on its admedian side; tail pale, except for the black lines on its four lower and median lateral keels; legs very feebly infuscate externally. Structurally resembling *V. variegatus*, but with the lateral surface of the *tail* scarcely granular, lower side of fifth segment more coarsely and less thickly granular, and scarcely a trace of coarser granulation on the upperside of the *humerus*. *Pectinal teeth* 16–18.

♂. Differing more from the male of *V. variegatus* than do the females; colour the same as in the female; *tail* with the upper and lateral surfaces of the first, second, and third segments smooth; fourth segment smooth above, below, and at the sides; fifth segment smooth laterally. Upperside of *humerus* without coarse granulation. *Pectinal teeth* 19–21.

Measurements in mm.—♀. Total length 42, carapace 5, tail 22. ♂. Total length 37, carapace 4·5, tail 22.

Hab. Mexico (*Mus. Berol.*[1]), Jalisco (*Schumann* [2]), Guanajuato, in the mountains (*A. Dugès*).

The type of *V. punctatus*, Karsch, is unknown to me. Hence I accept the decision of Dr. Kraepelin, who presumably has examined this type, that it is conspecific with the specimen upon which *V. nigropictus* was based.

8. Væjovis nitidulus. (Tab. III. figg. 3, 3 *a–c*, ♂.)

Væjovis nitidulus, C. L. Koch, Die Arachn. x. p. 4, fig. 758 (1843) [1].

Vejovis nitidulus, Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 186 (1899) [2].

Væjovis nigrescens, Pocock, Ann. & Mag. Nat. Hist. (7) i. p. 396 (1898) [3].

Colour of trunk, chelæ, legs, and tail a tolerably uniform brown, the fourth and fifth segments infuscate beneath. *Carapace* a little shorter than caudal segment 1+2 or 5; rather coarsely granular, except on the frontal area. *Terga* finely shagreened in front, coarsely but sparsely granular posteriorly. *Tail* thick and longish, about four and a half times as long as the carapace; third segment as broad as long, fifth about twice as long as broad; superior and superior lateral keels granular, posteriorly dentate, except the

superior lateral of the fourth, which is almost smooth; the inferior median keels absent on segments 1–4 as in *V. variegatus*; inferior laterals at most finely crenulate; superior and superior lateral surfaces of tail finely and sparsely granular; fifth segment with keels finely granular, its lateral and inferior surfaces finely and closely granular; vesicle punctured, scarcely granular. *Chelæ* long, finely granular; the crests granular, including the posterior crest on the upperside of the brachium; hand coarsely granular internally, smooth above and weakly crested; movable fingers long, longer than the carapace; brachium or humerus about as long as the carapace.

Measurements in mm.—Total length 58, carapace 7, tail 34, movable finger 8·8, of type of *V. nigrescens*.

Hab. Mexico [1] (*Mus. Brit.*[3]), Guanajuato, in houses (*A. Dugès*).

Though resembling *V. variegatus* and *V. punctatus* in the absence of the inferior median keels of caudal segments 1–4, *V. nitidulus* differs from those two, and from all the other known species of the genus, in the length of its chelæ, which have the humerus or brachium as long as the carapace and the movable finger considerably longer.

The following species, based upon an unsexed specimen, is unknown to me:—

Væjovis intrepidus.

Vejovis intrepidus, Thorell, Atti Soc. Ital. Sci. Nat. xix. p. 183 (1877) [1].

Hab. Mexico [1].

Kraepelin [Jahrb. Hamb. Wiss. Anst. xi. p. 199 (1894) and Das Tierr., Scorpiones et Pedipalpi, p. 185 (1899)] cites this species, without even a mark of interrogation, as synonymous with *V. mexicanus*, Koch. In face of Thorell's description, I find it impossible to adopt this opinion. The measurements given show that *V. intrepidus* is about twice the size of the average *V. mexicanus*, the length being 84, the carapace 11·5, and the tail 52·5 mm. Moreover, the third caudal segment is one-third longer than wide (9 : 6) and the second as long as wide. Lastly, the inferior caudal keels, although well expressed, are described as subcrenulate, except the median keels on segments 1, 2, and 3, which are smooth, those on the third being subcrenulate only posteriorly. So far as these keels are concerned, as well as in colour and certain other characters, *V. intrepidus*, apart from its much greater size, most nearly approaches *V. cristimanus*, and it may conceivably be based upon a large male of that species, of which only the female is up to the present time known.

ANUROCTONUS.

Anuroctonus, Pocock, Ann. & Mag. Nat. Hist. (6) xii. p. 328 (1893); Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 183 (1899).

Oncocentrus, Thorell, Bull. Soc. Ent. Ital. xxv. p. 374 (1894).

Carapace with its anterior border shallowly excised, with rounded frontal lobes; three principal lateral eyes on each side; ocular tubercle in front of its middle. *Mandible* with movable finger either unarmed below or furnished with a few, only about three, minute teeth. *Chelæ* with fingers furnished with a single median row of teeth, flanked on each side by a few larger scattered teeth; the brachium supplied beneath

posteriorly with a row of about 9 setiferous pores. *Pectines* with the intermediate lamellæ normally separated. *Tarsi* furnished with a median row of spicules and lateral setæ; a distinct inferior median claw. *Stigmata* long and slit-like. Tail with the fourth segment keelless below. Dorsal half of the aculeus spherically swollen in the male.

Type and only known species *A. phœodactylus* (Wood).

Distribution. Southern States of North America; Guatemala (sec. Thorell).

1. **Anuroctonus phæodactylus.** (Tab. III. figg. 4, 4 *a–e*, ♀; Tab. IV. figg. 1, 1 *a–c*, ♂.)

Centrurus phaiodactylus, Wood, Proc. Ac. Philad. 1863, p. 111 [1]; Journ. Ac. Philad. (2) v. p. 372 [2].

Uroctonus phœodactylus, Karsch, Mittheil. Münch. ent. Ver. iii. p. 103 (1879) [3]; Kraepelin, Jahrb. Hamb. Wiss. Anst. xi. p. 196 (1894) [4].

Anuroctonus phœodactylus, Pocock, Ann. & Mag. Nat. Hist. (6) xii. p. 328, t. 14. figg. 14, 14 *a–c* (1893) [5]; Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 183, fig. 58 (1899) [6].

Oncocentrus phœodactylus, Thorell, Bull. Soc. Ent. Ital. xxv. p. 375 (1894) [7].

♂. *Colour* reddish or yellowish-brown, the tergite darker; chelæ and legs yellower, the fingers infuscate, a dark spot at distal end of brachium above; legs yellow, with a dark spot at the distal end of the femur and patella; caudal segments darker beneath posteriorly. *Carapace* smooth, granular on frontal lobes anteriorly and on the sides, a little longer than caudal segments $1+2+\frac{1}{2}$ of 3 and as $3+4$. Terga shagreened and granular. *Sterna* smooth, the last with four strong granular keels. *Tail* about three and a half times as long as the carapace, the superior and superior lateral keels weakly granular, the four inferior strong and tubercular on segments 1–3, weak on segment 4; fifth with 3 strong inferior keels; vesicle almost smooth, compressed, inflated, as high as wide. *Chelæ* large; humerus finely granular, with strong granular crests; brachium almost smooth, with strong anterior granular crest and a strong tooth on the anterior surface; hands smooth and punctured, a single weak keel above, its width about three-fourths the length of the movable finger, which is shorter than the carapace and as long as the underhand. *Pectinal teeth* 8–10.

♀. Like the male, but smoother, with smaller pectines and 5–6 teeth.

Measurements in mm.— ♂. Total length 67, carapace 11, tail 37. ♀. Total length 74, carapace 11·5, tail 35.

Hab. North America, California, Utah, Virginia, and Colorado.—Guatemala [7].

The description given above and the figures on Tabb. III. and IV. are taken from two specimens in the British Museum—the male from San Bernardino in California and the female from Denver in Colorado.

UROCTONUS.

Uroctonus, Thorell, Ann. & Mag. Nat. Hist. (4) xvii. p. 11 (1876); Atti Soc. Ital. Sci. Nat. xix. p. 196 (1877); Bull. Soc. Ent. Ital. xxv. p. 374 (1894); Karsch, Mittheil. Münch. ent. Ver. iii. p. 103 (1879); Pocock, Ann. & Mag. Nat. Hist. (6) xii. p. 328 (1893); Kraepelin, Jahrb. Hamb. Wiss. Anst. xi. p. 193 (1894); Das Tierr., Scorpiones et Pedipalpi, p. 182 (1899).

Allied to *Anuroctonus*, but with the movable finger of the mandible furnished below with 5 small but distinct teeth. Brachium of the *chelæ* supplied beneath with only a few (3 or 4) setiferous pores. Intermediate lamellæ of the *pectines* distally breaking up into about 6 subequal subspherical sclerites. *Stigmata* short and suboval. *Tail* with its fourth segment granularly keeled below. Last abdominal *sternum* scarcely visibly keeled. Basal half of *aculeus* not globularly swollen in male.

Type and only known species *U. mordax*, Thor.

Distribution. California; Guatemala (sec. Thorell).

1. **Uroctonus mordax.** (Tab. IV. figg. 2, 2 *a–f*, ♂.)

Uroctonus mordax, Thorell, Ann. & Mag. Nat. Hist. (4) xvii. p. 11 (1876) [1]; Atti Soc. Ital. Sci. Nat. xix. p. 196 (1877) [2]; Bull. Soc. Ent. Ital. xxv. p. 374 (1894) [3]; Karsch, Mittheil. Münch. ent. Ver. iii. p. 103 (1879) [4]; Pocock, Ann. & Mag. Nat. Hist. (6) xii. p. 330, t. 14. fig. 15 (1893) [5]; Kraepelin, Jahrb. Hamb. Wiss. Anst. xi. p. 194 (1894) [6]; Das Tierr., Scorpiones et Pedipalpi, p. 182 (1899) [7].

♂. *Colour* a uniform deep brown, legs yellower, hands with a reddish tint. *Carapace* a little longer than the first and second caudal segments and abont as long as the fifth, finely granular. *Terga* finely punctulate, granular laterally and along the posterior border, the last granular throughout and furnished with four granular crests. *Sterna* smooth, finely punctured, the last scarcely crested. *Tail* about four times as long as carapace, slender, second segment a little longer than wide, fifth rather more than twice as long as wide; all the caudal keels present, but the median lateral absent on segments 2–4 and scarcely developed on the first; the inferior medians and laterals smooth or nearly so on segments 1 and 2, weakly granular on the third, strongly granular on the fourth; the intercarinal spaces almost smooth, finely granular; fifth segment finely granular, the inferior keels subdenticulate; vesicle smooth, pyriform, a little wider than high; aculeus very lightly curved. *Chelæ* finely granular, with strong granular crests; the brachium with three strong teeth in front; upperside of hand with a network of fine granules, with a strong external finger-keel separating the horizontal inner from the vertical outer portion of the upper surface; width of the hand a little less than the length of the underhand, which is about equal to that of the movable finger, the latter not lobate. *Legs* with granular femora. *Pectinal teeth* 10–12.

♀. Differing from male in having the hand smooth and the strong finger-keel absent. Pectines with 8 teeth.

Measurements in mm.— ♂. Total length 42, carapace 6, tail 23·5; width of first segment 2·5, of fifth 1·8, length of latter 5·5; length of brachium 5, width 2; width of hand 4; length of underhand 5, of movable finger 5·8.

Hab. North America, San Francisco, California.—Guatemala [3].

The above-given description is based upon a male example from California in the British Museum, the only example available for the purpose. The characters of the female are taken from Kraepelin's monograph. According to this author the specimens of this species reach a length of 60 mm.

BROTEOCHACTAS.

Broteochactas, Pocock, Ann. & Mag. Nat. Hist. (6) xii. pp. 77, 78 (1893); Journ. Linn. Soc., Zool. xxiv. p. 399 (1893); Kraepelin, Jahrb. Hamb. Wiss. Anst. xi. pp. 175, 178 (1894); Das Tierr., Scorpiones et Pedipalpi, p. 172 (1899).

Anterior border of *carapace* lightly depressed mesially, but not excised. Two lateral *eyes* on each side. *Mandible* with fingers not toothed inferiorly. *Chelæ* with a single row of teeth along the middle line and flanked internally by a few larger lateral teeth. *Sternum* wider than long. *Pectines* with shaft segmented and small triangular fulcra. *Tarsi* furnished beneath with somewhat irregularly-arranged setæ, without median row of spicules. *Tail* smooth below anteriorly or with paired keels. *Stigmata* oval.

Type *B. gollmeri*, Karsch.

Distribution. S. America as far south as the Amazons; Panama.

1. **Broteochactas delicatus.** (Tab. IV. figg. 3, 3 *a–f*, ♀; 4, 4 *a*, *b*, ♂.)

Chactas delicatus, Karsch, Mittheil. Münch. ent. Ver. iii. p. 134 (1879) (♀) [1].

Broteochactas delicatus, Pocock, Journ. Linn. Soc., Zool. xxiv. p. 401 (1893) [2]; Kraepelin, Jahrb. Hamb. Wiss. Anst. xi. p. 77 (1894) [3]; Das Tierr., Scorpiones et Pedipalpi, p. 174 (1899) [4].

Chactas opacus, Karsch, Mittheil. Münch. ent. Ver. iii. p. 134 (1879) (♂)[5].

Broteas panamensis, Thorell, Bull. Soc. Ent. Ital. xxv. p. 382 (1893)[6].

♀. *Colour* a deep reddish-brown, ventral side of trunk ochre-brown; vesicle clear reddish-brown; chelæ nearly black; legs clear reddish-brown. *Carapace* as long as the first and second, and one-fourth of the third, caudal segments, slightly longer than the fifth, smooth and polished on the frontal area, on the ocular tubercle, and behind on the middle, finely and closely granular at the sides. *Terga* smoothly polished, slightly shagreened at the sides, the last very distinctly granular and bitubercular laterally. *Sterna* smooth and polished, the last without keels; an ill-defined pale (sensory?) area in the middle of the posterior border of the third. *Tail* about three and a half times as long as the carapace, narrowed posteriorly; the first segment much wider than long, second a little wider, third as wide as long, fourth one-fourth longer than wide, fifth a little more than twice as long as wide and about twice as long as the second segment; superior and superior lateral keels developed and granular, and the rest of the keels obsolete on segments 1–4; upperside of these segments scarcely granular, the sides weakly granular; underside of first and second smooth and polished, of third weakly granular behind, of fourth coarsely granular; fifth segment coarsely granular below and at the sides; vesicle granular below, its width a little wider than its height and equal to the width of the fifth caudal segment. *Chelæ* with two granular crests above, weakly granular above and in front; brachium very weakly granular above and behind; hand thick, its width a little exceeding the length of the underhand and equal to the movable finger, covered above and to a less extent below with a fine network of granules, which spread on to the base of the fingers; the inner edge subdenticulate; fingers short, the immovable less than twice as long as wide, the movable a little shorter than the carapace. *Legs* smooth and polished; the femora at most very weakly granular. *Pectines* with 8 teeth.

♂. The same size and colour as the female. The *terga* shagreened. *Sterna* as in female, but with the sensory area on the third more conspicuous. *Tail* longer, about four and a half times as long as the carapace, which is scarcely as long as the fifth segment; vesicle inflated, the width equal to that of the first caudal segment. *Chelæ* hardly differing from those of the female. *Pectines* larger than in female, with 8 teeth.

Measurements in mm.— ♀. Total length 50, carapace 7, tail 25; width of hand 5·5; length of underhand 5, of movable finger 5·5. ♂. Total length 51, carapace 6·2, tail 29.

Hab. Panama[6].—Colombia; Venezuela; Guiana.

The type of *Broteas panamensis*, Thorell, has been kindly submitted to me for examination by Prof. Targioni-Tozzetti, of the Florence Museum. I was thus enabled to establish its specific identity with specimens in the British Museum from Guiana, from which the above-given description has been taken.

PLESIOCHACTAS.

Plesiochactas, Pocock, Ann. & Mag. Nat. Hist. (7) v. p. 470 (1900).

Carapace not narrowed anteriorly, truncate, with squared antero-lateral angles; two lateral eyes on each side. Movable finger of *mandible* with a row of small teeth on the inferior border. Fingers of the *chelæ* armed with numerous minute teeth, forming two rows along the middle of their length and flanked on each side by about half a dozen larger-spaced teeth. *Sternum* of cephalothorax wider than long. *Pectines* with the shaft distinctly and normally segmented and distinct fulcra. Segments of the *tail* and last abdominal *sternum* furnished beneath with a single median inferior keel. *Tarsi* furnished beneath with two rows of slender bristles.

Type. Species represented by specimen described as *P. dugesi*, which probably equals *Megacormus granosus*, var. *dilutus*, Karsch.

Distribution. Mexico.

1. **Plesiochactas dilutus.** (Tab. IV. figg. 5, 5 *a–f*, ♀.)

Megacormus granosus, var. *dilutus*, Karsch, Arch. f. Naturg. 1881, p. 18 [1].

Plesiochactas dugesi, Pocock, Ann. & Mag. Nat. Hist. (7) v. p. 470 (1900) [2].

♀. *Colour* deep reddish-brown, nearly black, the smooth areas of the carapace reddish; the terga with a small posterior median yellow spot, a much larger yellow spot on each side of this, the series forming two nearly complete and uninterrupted dorsal bands; also a large but not strongly defined yellow spot on the posterior angle; tail deep red-brown, mottled with black; sterna deep brown, paler mesially; chelæ deep reddish-brown, fingers blacker with yellow tips; legs yellow, broadly banded with black; sternum and coxæ yellow, the former and the maxillary processes of the first and second leg partially infuscate; coxa of chela blackish. *Carapace* coarsely and subserially granular; a median granular crest running backwards from the ocular tubercle and a series of coarse granules on each side from lateral eyes; the ocular tubercle with two rows of granules; carapace as long as caudal segments $1+2+\frac{1}{2}$ of 3, or as 3+4 or 5, a little shorter than the movable finger. *Terga* finely granular in front, very coarsely granular in the posterior half, not distinctly keeled, except the last, which has four coarsely granular keels, with its median area finely and closely granular. *Sterna* finely and closely punctured; the last finely granular, with a single median and an abbreviated granular crest on each side, a few coarse granules on its posterior and lateral margins as well as on the lateral margin of the fourth sternum. *Tail* between three and four times as long as the carapace; its third segment as wide as long, fourth one-fourth longer than wide; fifth nearly or quite three times as long as wide; all the keels coarsely granular, the inferiors on segments 2–4 posteriorly denticulate; upper surface of 1–4 with a median closely granular area; the lateral and inferior surfaces much more coarsely but somewhat sparsely granular, the inferior surface of the first nearly smooth; fifth very weakly granular above, with squared, coarsely granular superior lateral edges; the lateral and inferior surfaces and the inferior crests granular, as on the other segments; median lateral keel strong on the first, present on the anterior fourth of the fifth, absent on the other segments; vesicle granular throughout, except on the normal smooth tracts, piriform, a little wider than high and about as wide as the fifth caudal segment or as the humerus; aculeus long and lightly curved. *Chelæ* with humerus and brachium coarsely but not closely granular, smooth or nearly so, all the keels coarsely granular, anterior side of brachium with at least two strong teeth; hand considerably wider than brachium, its width about two-thirds the length of the underhand; furnished with seven granular keels, its upper surface with two granular finger-keels and a keel between them, the area between the keels coarsely but not closely granular; fingers long and slender, not lobate. *Legs* with femur and patella granularly crested, femur of third and fourth granular on the external surface as well. *Pectines* with 8–9 teeth.

Measurements in mm.—Total length 42, carapace 6, tail 24; width of first segment 3, of fifth 2, of brachium 2·2, of hand 3; length of underhand 4·8, of movable finger 6·5.

Hab. Mexico, Atoyac in Vera Cruz (*A. Dugès* [2]), Cordova [1].

It appears to me to be highly probable that the type of *Plesiochactas dugesi*, from Atoyac, is conspecific with those from Cordova, which Karsch regarded as a variety of *Megacormus granosus* and named *dilutus*. These specimens measure 57–65 mm., have 8 and 9 pectinal teeth, smooth sterna, no median tergal keel, and no wart-like tubercles between the two inner keels on the last tergal plate. I have also seen a young specimen of this or a nearly allied species from Guatemala.

MEGACORMUS.

Megacormus, Karsch, Arch. f. Naturg. xlvii. p. 17 (1881); Kraepelin, Jahrb. Hamb. Wiss. Anst. xi. p. 151 (1894); Das Tierr., Scorpiones et Pedipalpi, p. 161 (1899).

Related to *Plesiochactas*, and apparently a specialized offshoot of it. Distinguishable by having the carapace narrowed in front, by the reduction in size of the pectines (which is accompanied by the entire loss of

the fulcra), and by the difference in the stigmata, which have the form of narrow crescentic slits opening upon an elevated smooth oval area.

Type *M. granosus* (Gervais).

Distribution. Mexico.

1. **Megacormus granosus.** (Tab. V. figg. 1–1 *h*, ♂.)

Scorpio (*Chactas*) *granosus*, Gervais, Arch. Mus. iv. p. 233, t. 12. figg. 42–44 (1844) [1]; Ins. Apt. iii. p. 65 (1844) [2].

Chactas granosus, Karsch, Mittheil. Münch. ent. Ver. iii. p. 111 (1879) [3].

Megacormus granosus, Karsch, Arch. f. Naturg. xlvii. p. 17 (1881) [4]; Kraepelin, Jahrb. Hamb. Wiss. Anst. xi. p. 151 (1894) [5]; Das Tierr., Scorpiones et Pedipalpi, p. 162 (1900) [6]; Pocock, Ann. & Mag. Nat. Hist. (7) v. p. 470 (1900) [7].

[Nec *Scorpio granosus*, Gervais, in Castelnau's Expéd. dans l'Amér. du Sud, Myriap. et Scorp. p. 42, t. 2. figg. 2, 2 *a–c* (1857).]

Hab. Mexico [1 2 3 6], Cordova [4], Huatusco.

This species apparently differs from *M. segmentatus* in having the pectines without the transverse joints, the basal portion of the shaft exhibiting merely a longitudinal sulcus; but I have had no opportunity of comparing in detail a specimen of *M. granosus* with the type of *M. segmentatus*. The figure of the former on Tab. V. is taken from an example kindly lent me by Dr. Fritsch, the same example as that described by Kraepelin; and since only one example of each of the two kinds has been examined, it is possible that the difference in the structure of the pectines above referred to may prove to be merely sexual. Nevertheless it is possible that a detailed and comparative study of the two forms with the types, side by side, may reveal other differential features which under present circumstances it is not possible to point out.

2. **Megacormus segmentatus.**

Megacormus segmentatus, Pocock, Ann. & Mag. Nat. Hist. (7) v. p. 470 (1900) [1].

Colour a tolerably uniform deep brown; terga with an indistinct marginal spot in the middle and on the posterior angle; ventral surface a little paler; legs indistinctly banded. Upperside of *trunk* coarsely and closely granular, a long median granular crest running backwards from the ocular tubercle; terga without crests, except the last, which has four coarsely granular crests, the median area of the plate coarsely granular. *Sterna*, especially the first, fourth, and fifth, granular; the second and third smooth and punctured anteriorly; the fifth coarsely granular throughout, with a short median keel and a few large granules forming a very short crest on each side. *Tail* about three and a half times as long as the carapace, which equals the first, second, and half the third or the third and fourth segments and slightly exceeds the fifth; third segment wider than long, fourth a little longer than wide, fifth a little more than twice as long as wide; all the keels coarsely granular; lateral and inferior surfaces coarsely granular, a few coarse granules on the upperside of the first, second, third, and fourth segments, a median lateral crest on the first and on the anterior half of the fifth; upperside of fourth deeply excavated, with elevated keels, also of the second and third, though to a less degree; upperside of fifth with sharp elevated lateral border, space between them very finely granular; vesicle smooth and punctured above, very finely granular below and laterally, almost as wide as the fifth segment and considerably wider than the humerus. *Chelæ*: upperside of humerus and brachium coarsely granular, all the crests coarsely granular; the brachium with five crests, one large

tooth on its anterior border; hand with six granular keels, the inner half of its upperside with two granular finger-keels and one keel between them, its outer surface with a median keel; width of hand about two-thirds the length of the underhand, which is almost equal to the movable finger; the latter a little shorter than the carapace, without lobe. *Legs* externally granular; coxæ thickly granular. *Pectinal teeth* 4; shaft of pecten distinctly segmented, divided by two transverse sulci into an apical, a median, and a basal sclerite, the latter divided by a longitudinal sulcus.

Measurements in mm.—Total length 32, carapace 4·5, tail 16; width of first segment 2, of fifth 1·5, of brachium 1·5, of hand 2·5; length of underhand 3·5, of movable finger 4.

Hab. Mexico, Atoyac in Vera Cruz (*A. Dugès* [1]).

Fam. BUTHIDÆ.

In all the known Central-American genera of this family the sternum of the cephalothorax is triangular, its sides anteriorly converging; there are two pedal spurs upon the arthrodial membrane connecting the protarsus with the tarsus, and the anterior of these is branched; the two halves of the genital operculum are separated in both sexes and there is a single tooth upon the lower side of the immovable fang of the mandible.

Distribution. Tropical and temperate countries of Eastern and Western Hemispheres to the south of 40°–45° of North latitude.

Synopsis of the Central-American Genera.

a. Dentition of the fingers of the chela consisting of series of median rows of teeth flanked by numerous small supernumerary teeth.	
a^1. Tail not posteriorly expanded, longer in male than in female; sternum of first abdominal somite scarcely sulcate	Centruroides, Marx.
b^1. Tail posteriorly expanded, much thicker but scarcely longer in male than in female; first abdominal sternum strongly sulcate.	Rhopalurus, Thor.
b. Dentition of fingers of chelæ consisting of median rows of teeth.	
a^2. Rows of teeth on the fingers of the chelæ not overlapping . .	Isometrus, Hempr. & Ehr.
b^2. Rows of teeth on the fingers of the chelæ largely overlapping .	Tityus, C. Koch.

CENTRUROIDES.

Centrurus, Hempr. & Ehrenb. Symb. Phys., Scorp. p. 12 (1828) (part.) (nomen nudum); Peters, Mon. Ak. Wiss. Berlin, 1861, p. 512 (part.); Thorell, Ann. & Mag. Nat. Hist. (4) xvii. p. 9 (1876); Atti Soc. Ital. Sci. Nat. xix. p. 83 (1877); Karsch, Mittheil. Münch. ent. Ver. iii. p. 18 (1879); Pocock, Journ. Linn. Soc., Zool. xxiv. pp. 385, 391 (1893); Kraepelin, Jahrb. Hamb. Wiss. Anst. viii. p. 119 (1891); Das Tierr., Scorpiones et Pedipalpi, p. 87 (1899) (part.).

Tityus, C. Koch, Die Arachn. xi. pp. 1–48 (1845) (part.) [nec iii. p. 33 (1836)].

Nec *Centrurus,* C. Koch, Die Arachn. iv. p. 110 (1838); Gervais, Ins. Apt. iii. p. 49 (1844).

Nec *Centrurus,* Wood, Proc. Ac. Philad. 1863, p. 111; Journ. Ac. Philad. (2) v. p. 372 (1863).

Centruroides, Marx, Proc. U. S. Nat. Mus. 1889, p. 211.

The median rows of teeth on the digits of the *chelæ* not overlapping at the apices and flanked on each side by rows of more scattered teeth, which occupy the interspaces between the large lateral teeth. *Pectines* narrow, only gradually attenuate from base to tip; without enlarged basal lobe. *Sternum* of first abdominal segment with an ill-defined shallow depression, not a distinct groove, on each side running forwards from the inner extremity of the stigma and with no definite depressed lateral area beneath the pectines. *Tail* without median lateral keel on the second and third segments, always narrowed posteriorly in the female and generally also in the male, and always longer and not broader in the male than in the female.

Type *C. exilicauda* (Wood).

Distribution. Southern States of North America (California, Texas, Florida); West Indies, Bahamas, and the islands of the Caribbean Sea; Central America as far south as Panama, whence one species spreads along the Andean Chain through Colombia and Ecuador as far as Chile.

Synopsis of the Species.

a. Fingers of the chelæ furnished with eight rows of teeth along the middle line (or seven when the two proximal rows are coalesced), without including the apical row.

*a*¹. Fingers black, at least on the basal half, and sharply contrasted with the pale-coloured hand.

*a*². Terga with broad, median, and lateral pale bands; hands very wide, in female equalling, in male much exceeding width of second caudal segment; subaculear tooth minute or absent . . . . . *nitidus*, Thor.

*b*². Terga with narrow median and lateral pale bands; hands in female much narrower than second caudal segment, in male a little narrower; subaculear tooth large . . . . . *flavopictus*, Poc.

*b*¹. Fingers practically the same colour as the hand.

*a*³. Upperside of trunk, chelæ, legs, tail, and the abdominal sterna marbled with black and yellow; pectinal teeth 13–15 . . . . *thorelli*, Kraep.

*b*³. At least the first four abdominal sterna uniformly pale; pectinal teeth not less than 16.

*a*⁴. Upperside of abdomen ornamented with a pair of black bands separated from each other and from the lateral border by yellow bands.

*a*⁵. Carapace yellow only at the sides, the whole of the interocular triangle and the area behind the tubercle fuscous.

*a*⁶. Subaculear tooth close to base of aculeus; black bands on terga hardly or not wider than median and lateral pale bands; tail in male very long and slender; the vesicle more than twice as long as high . . . . . *vittatus*, Say.

*b*⁶. Subaculear tooth remote from base of aculeus; black bands on trunk quite twice as wide as the yellow bands; vesicle in male less than twice as long as high . . . . . *ornatus*, sp. n.

*b*⁵. Carapace rarely uniformly yellow, more usually marked with

four narrow black stripes; terga coloured as in *C. vittatus*; tail of male as in *C. ornatus* . . . . . *elegans*, Thor.

b^{4}. Upperside of carapace and terga uniformly coloured in the adult.

a^{7}. Legs, chelæ, sterna, and tail uniformly ochre-yellow; terga either the same tint as the legs or tinted with fuscous; vesicle of male evenly oval when viewed from below.

a^{8}. Keels on hands and last sternal plate strong and smooth or almost smooth; subaculear spine long and sharp . . . *ochraceus*, Poc.

b^{8}. Keels on hands and last sternal plate evenly and finely granular; subaculear tooth small.

a^{9}. Vesicle of male ovate, only twice as long as wide . . . *bertholdi*, Thor.

b^{9}. Vesicle of male long, nearly three times as long as wide . *subgranosus*, Kraep.

b^{7}. Chelæ with the hands much darker than the brachium; tail much darker posteriorly; upperside of trunk deep reddish- or blackish-brown; chelæ thickly hairy; vesicle of male broad and shouldered at base of aculeus . . . . . *margaritatus*, Gerv.

b. Fingers of chelæ furnished with nine rows of teeth along the middle line, not including a short apical row.

a^{10}. Subaculear spine close to base of aculeus, barely its own basal width from it; its apex turned towards the aculeus.

a^{11}. Legs, chelæ, trunk, and tail uniformly black, only the tips of the fingers and the tarsi pale . . . . . *nigrescens*, Poc.

b^{11}. Not uniformly black; the legs rich yellow; at least the humerus and basal segments of the chelæ yellow, last tergal plate paler than the rest; anterior caudal segments yellowish, the posterior darker.

a^{12}. Brachium of chela the same colour as the hand and much darker than the humerus . . . . . *fulvipes*, Poc.

b^{12}. Brachium of chela pale yellowish like the humerus and much paler than the hand . . . . . *nigrimanus*, Poc.

b^{10}. Subaculear spine more than its own basal width from the aculeus, from which its apex is turned away.

a^{13}. Colour of body, legs, chelæ, and tail yellow, except that the edges of the terga, the fingers, and the end of the tail are black . . . *limbatus*, Poc.

b^{13}. At least the carapace and terga (with the exception of the last in *C. bicolor*) blackish or deep brown.

a^{14}. Last tergal plate of abdomen yellow; hands much darker than brachium . . . . . *bicolor*, Poc.

b^{14}. Last tergal plate of abdomen not yellow, at most a little paler than the rest; hand not darker, usually paler than brachium.

a^{15}. Pectinal teeth 20–23; granules on caudal keels few in number and remote from each other . . . . . *rubricauda*, Poc.

b^{15}. Pectinal teeth 26–36; granules on caudal keels numerous and close-set . . . . . *gracilis*, Latr.

1. Centruroides thorelli. (Tab. V. figg. 2, 2 *a–c*, ♀ ♂.)

Centrurus thorelli, Kraepelin, Jahrb. Hamb. Wiss. Anst. viii. p. 124 (1891)[1]; Das Tierr., Scorpiones et Pedipalpi, p. 89 (1899)[2].

♀. *Colour*: upperside of trunk blackish, the carapace variegated with symmetrically arranged yellow patches; the terga with a narrow median and marginal yellow stripe and generally a pair of irregularly defined >< -shaped marks; sterna yellow, variegated with black, the first almost uniformly yellow, the fifth densely variegated; tail marbled with black below and laterally, especially at its posterior end; legs, chelæ, and cheliceræ marbled black and yellow, the fingers uniformly yellow throughout. Upperside of *trunk* closely and coarsely granular, no lateral keels on the terga; carapace as long as the first and one-third of the second caudal segments, and about as long as the fourth. *Sterna* smooth; the last finely granular, with four granular keels. *Tail* a little more than five times as long as the carapace, slightly narrowed posteriorly, fourth segment about twice as long as wide; the intercarinal spaces, even on the upperside, finely granular, all the keels coarsely granular; vesicle coarsely granular below, with a large subaculear tooth remote from the base of the aculeus. *Chelæ* finely granular; the crests, including those on the upperside of the hand, granular; hand only slightly wider than the brachium, the width about three-quarters the length of the underhand, which is more than half the length of the movable finger, the latter very weakly lobate and furnished with eight rows of teeth (seven when the two proximal rows are united). *Pectinal teeth* 13–16.

♂. Like the female in colour and most structural features, but the *tail* much longer, more than seven times as long as the carapace, which is about equal to its first segment, its fourth segment nearly four times as long as wide. *Vesicle* unique in shape, flat below, nearly parallel-sided, but widest distally on each side of the base of the aculeus, where it rises into a pair of rounded shoulder-prominences. *Chelæ* longer than in female; the hand weakly crested; fingers not lobate, movable one-third longer than underhand.

Measurements in mm.— ♀. Total length 39, carapace 4, tail 22; width of hand 1·2; length of underhand 2·5, of movable finger 4·5. ♂. Total length 42, carapace 3·2, tail 28; width of hand 1; length of underhand 2·5, of movable finger 4·2.

Hab. GUATEMALA[1] (*Mus. Brit.*), Guatemala city and Volcan de Agua (*O. Stoll*).

2. Centruroides elegans. (Tab. V. figg. 3, 3 *a–c*, ♀ ♂.)

? *Scorpio granosus,* Gervais, in Castelnau's Expéd. dans l'Amér. du Sud, Myriap. et Scorp. p. 42, t. 2. figg. 2, 2 *a–c*[1] (nec *Scorpio granosus,* Gervais, Arch. Mus. iv. p. 233, 1844).

? *Tityus infamatus,* C. Koch, Die Arachn. xi. p. 46, fig. 873 (1845)[2].

Centrurus infamatus, Kraepelin, Jahrb. Hamb. Wiss. Anst. viii. p. 125 (1891) (part.)[3]; Das Tierr., Scorpiones et Pedipalpi, p. 90 (1899) (part.)[4].

Centrurus elegans, Thorell, Atti Soc. Ital. Sci. Nat. xix. p. 145 (1877)[5].

Centrurus limpidus, Karsch, Mittheil. Münch. ent. Ver. iii. p. 120 (1879)[6].

♀. *Colour*: upperside of trunk yellow, banded with black; carapace with black margin, black ocular tubercle, and four black lines, one on each side passing backwards and slightly inwards from the lateral eyes to the posterior border, and one on each side close to the middle line from the anterior border to the ocular tubercle, thence backwards on each side of the median groove to the hinder border; dorsal side of abdomen with a pair of broad black bands separated by a broad median yellow band and from the lateral borders by another yellow band, the yellow and black bands approximately equal in width; last tergite not distinctly banded; ventral surface pale; tail, legs, and chelæ quite pale or mottled with black; fingers same colour as hands. Upperside of *trunk* closely and thickly granular, the terga with scarcely a trace of lateral keels even on the fifth and sixth. *Carapace* as long as the first + $\frac{1}{3}$ of the second caudal segments, a little longer than the fourth, and shorter than the fifth. *Sterna* smooth and polished, the third mesially pitted, fourth with a pair of abbreviated submedian keels, fifth closely granular, with four granular crests. *Tail* a little more than five times as long as the carapace, finely granular throughout, with strong keels studded with pearly granulations; vesicle nearly smooth, with a small tubercle beneath and remote from

the aculeus. *Chelæ* at most finely granular, the crests with pearl-like granulations; hand wider than the brachium, its width less than half the length of the movable finger, its upperside with two finely granular keels running from the immovable finger; movable finger a little longer than the carapace, furnished with a large basal lobe and with eight rows of teeth. Pectinal teeth 22–23.

♂. Like the female in colour and granulation. *Tail* much longer, as much as about six and a half times as long as carapace, which is slightly longer than the first segment and about half the length of the first and second; fifth caudal segment a little narrower than the first, almost as high as wide and a little less than three times as long as high; vesicle broadly oval, about twice as long as high. *Hand* a little wider and longer than in female; the fingers not quite in contact basally when closed. Pectinal teeth 23–25.

Measurements in mm.— ♀. Total length 60, carapace 6, tail 35; width of brachium 2, of hand 2·2. ♂. Total length 63, carapace 5·5, tail 40; width of first segment 2·7, of fifth 2·5, height of latter 2·5; length of vesicle 4, height and width 2; width of brachium 2, of hand 2·3.

Hab. MEXICO [3–6], Yautepec (*A. Dugès*), Acapulco, Amula, Omilteme, Cuernavaca (*H. H. Smith*).

The above-given description is taken from adult male and female examples from Yautepec. In addition to these, the Godman and Salvin collection contains large numbers of specimens ticketed S. Mexico, and others from Acapulco, Amula, and Omilteme (8000–8500 feet), in the State of Guerrero, as well as a few from Cuernavaca.

Kraepelin determined this species as *C. infamatus*, C. Koch, but none of the specimens that I have seen agree with the description and figures of the typical example of that species, for which no locality was known. This specimen, measuring 60 mm. in length, had a large, blunt, subaculear tubercle; the legs were marbled, but the chelæ entirely pale, and the carapace had not the arrangement of colour characteristic of the examples described above, the anteocular area being given as brown, and the lateral portions dark brown with yellow edges, whereas the figure shows the carapace to have been ornamented on each side with three oblique black stripes, the anterior passing forwards from the median ocular tubercle. In this feature *C. infamatus* more nearly approaches the following species, *C. vittatus*.

Again, the individuals from Mexico described by Thorell as *Centrurus elegans*, although agreeing in coloration with those described above, differ in their very much larger size, being 82 mm. in length, with the carapace 8 and the tail 50, and in having a small and slender subaculear tooth. Of specimens representing, I believe, this form the British Museum has several examples, including adult males and females, for which, unfortunately, no locality is known. They differ from those described above in having the chelæ, cheliceræ, legs, and tail entirely pale, without trace of variegation, and in their larger size and in the presence of a distinct and slender subaculear tooth. An adult female measures 79 mm., with the carapace 8 and the tail 50, as in Thorell's type; and an adult male measures 68 mm., with the tail 44 and the carapace 6. It is interesting to observe that in one of the female examples the subaculear tooth is reduced to a small tubercle. The greater part of the specimens that I refer to this species seem to belong to the form that Karsch described as *C. limpidus*, the types of

which are said to be less than 50 mm. long and to have the subaculear tooth represented by a small tubercle.

It is probable that *C. elegans* and *C. limpidus* represent distinct subspecific forms of one and the same species, and no doubt many more will be brought to light with diligent collecting in other localities.

In addition to the two already discussed, the following may, I think, be recognized :—

Subsp. *insularis*, nov.

Resembling the forms identified above as *C. elegans* and *C. limpidus* in colour, size, and structural features, but without any trace of marbled variation on the legs, chelæ, cheliceræ, or underside of the tail, as in *C. elegans*.

Hab. Mexico, Tres Marias Is. (*Forrer*).

Three specimens—one male and two females.

Subsp. *nigrovariatus*. (Tab. V. figg. 4, 4 *a*, ♂.)

Centrurus nigrovariatus, Pocock, Ann. & Mag. Nat. Hist. (7) i. p. 387 (1898) [7].

Centrurus infamatus, var. *nigrovariatus*, Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 90 (1899) [8].

♂. Resembling male of form referred to *C. elegans* in colour and most structural features, but differing in the formation of the posterior segments of the tail, the fifth segment being wider than the first, with its upper surface much elevated in the middle, with a deep median groove expanding posteriorly into an oval depression.

Measurements in mm.—Total length 52, carapace 4·5, tail 33 ; width of its first segment 2·3, of its fifth 2·7 ; height of latter 2·5.

Hab. Mexico, Oaxaca [7].

Subsp. *pallidiceps*, nov.

♀. A pale form, with the chelæ, legs, and tail without trace of infuscation, and the carapace without stripes, only the ocular tubercle and the lateral border being infuscate; the spots on the terga faint. Further differing from *C. elegans* in having a relatively large and triangular subaculear tooth. Pectinal teeth 19.

Measurements in mm.—Total length 54, carapace 5·5, tail 33.

Hab. Mexico, Presidio (*Forrer*).

One specimen.

3. **Centrurus vittatus.** (Tab. VI. figg. 1, 1 *a*, *b*, ♀ ♂.)

? *Tityus infamatus*, C. Koch, Die Arachn. xi. p. 46, fig. 873 (1845) [1].

Buthus vittatus, Say, Journ. Ac. Sci. Philad. ii. pp. 61, 62 (1821) [2] [nec *Buthus vittatus*, Guérin, Voyage de la Coquille, ii. 2, p. 50 (1830)].

Scorpio (*Atreus*) *californicus*, Girard, in Marcy's Rep. Red River, p. 269 (1853) [3].

Buthus californicus, Wood, Journ. Ac. Sci. Philad. (2) v. p. 364 (1863) [4].

Buthus carolinianus, Wood, Journ. Ac. Sci. Philad. (2) v. p. 363 (1863) [5] [nec *Scorpio carolinianus*, Palisot de Beauv. Ins. rec. Afr. Amér. p. 191, t. 5. fig. 3 (1821), which = *Væjovis carolinianus*].

? *Centrurus olivaceus*, Thorell, Atti Soc. Ital. Sci. Nat. xix. p. 145 (1877) [6].

Hab. North America [3], Georgia [2], Florida [2], Kansas [5], Texas [5], California [4].

Subsp. *suffusus*, nov. (Tab. VI. figg. 2, 2*a*, ♂ ♀.)

♀. *Colour* differing from that of the female of *C. elegans* in that the carapace has a deep black triangular patch in front of and involving the eyes, and a pair of irregular broad bands extending from the ocular tubercle to the posterior border, sometimes uniting in the middle line, sometimes encroaching on the lateral area of the carapace; legs, chelæ, lower side of tail, and upperside of cheliceræ indistinctly speckled or uniformly pale; lower side of tail with traces at least of a median band. Structurally resembling female of *C. elegans*, but the subaculear tubercle much nearer to the base of the aculeus. Pectinal teeth 18.

♂. Like ♀ in colour. Structurally differing from the male of *C. elegans* in the form of the tail; this organ much longer and thinner, being about seven and a half times as long as the carapace, which is as long as its first segment, but less than half the length of the first and second segments taken together; fifth segment as high as wide, a little more than four times as long as high; vesicle long and oval, more than twice as long as high; subaculear tubercle close to base of aculeus. Pectinal teeth 23–24.

Measurements in mm.—♀. Total length 46, carapace 4·5, tail 27. ♂ (type). Total length 62, carapace 5, tail 40; length of fifth segment 8, height and width 1·5; width of first segment 2, length 5; length of third 7·8, width 1·8; length of vesicle 4, height 1·5.

Hab. MEXICO, Ventanas in Durango (*Forrer*), Durango (type, *A. Dugès*).

This description of the subsp. *suffusus* is taken from a male sent by Dr. Dugès and a young female example from Ventanas, both being from Durango. In addition to these, and a young specimen from the latter locality and a second male from Durango, the British Museum has many individuals of the typical form collected by Mr. William Taylor at San Diego and Duval in Texas. Say records the species from Georgia and Florida, and Wood states that it ranges through the Southern Atlantic States into Texas and Southern Kansas. It also occurs in California, if, as has been asserted (*cf. infra*, p. 26), *C. californicus*, Gir., be the same species.

Between the Texan and Mexican examples there are observable slight differences, both in colour and structure, which warrant the separation of the latter as a distinct subspecies. The two may be contrasted as follows:—

a. Anteocular triangle with sharply defined lateral edge; subaculear tooth in female remote from base of aculeus, as in *C. elegans*; in male the tail shorter and thicker, first segment much less than twice, third much less than thrice as long as wide; vesicle more elongate, with its aculeus less curved . . . . . *vittatus*, Say (Texan forms).

b. Anteocular patch with irregularly defined lateral edge, the whole of the upperside of the carapace more generally suffused with black; subaculear tooth close to base of aculeus in female; male with very long and slender tail, the first segment more than twice, the third at least thrice as long as broad; vesicle higher, the aculeus more curved . . . . . Subsp. *suffusus*, n.

The largest female example of the typical form from San Diego gives the following measurements:—Total length 68 mm., carapace 6·5, tail 42; and the largest male the following:—Total length 55 mm., carapace 5, tail 37; width of first segment 2·5, length 4·5; width of third 2·3, length 6; width of fifth 2, length 8.

In very young specimens the fifth segment of the tail and the hand of the chelæ are black. Traces of this blackness are also observable in half-grown examples. The pectinal teeth reach 25 in the female and 26 in the male.

In the above-given synonymy of *C. vittatus* I have cited *Buthus californicus* and *B. carolinianus* of Wood on the authority of Marx [Proc. Ent. Soc. Washington, i. p. 91 (1888)], although in a question of this kind requiring considerable powers of discrimination, backed by a longer experience and study than Dr. Marx possessed, no great weight can be attached to his opinion.

No doubt Wood's *B. carolinianus* is, as he states, Say's *B. vittatus*. In comparing *Scorpio californicus* of Girard with *Buthus carolinianus*, Wood says that the former differs from the latter in colour (the carapace being yellow and immaculate, except for a black border and black eye-spot), in the greater roughness of the body, the more strongly marked denticulate crests on the tail, in the more spinose inner surface of the chelæ, and the crests on these appendages more crenulate—characters which, if reliable, point at least to a subspecific distinction. Beyond this it would be unsafe to assert, since Wood's verdict was based upon the examination of the single specimen of *B. californicus* known to him and Girard. Marx, unfortunately, vouchsafes no word of explanation of the differences of colour and structure pointed out by Wood, leaving us to accept or reject his *ipse dixit* on the subject.

4. **Centruroides ornatus,** sp. n. (Tab. VI. figg. 3, 3 *a*, *b*, ♀ ♂.)

♀. Differing from *C. elegans* principally in colour. *Carapace* with the whole of its median area deep brown, yellow only externally; the brown tergal bands broad, about twice as broad as the median yellow stripe or rather broader, also considerably broader than the lateral pale band, each patch, moreover, is complete and extends from the anterior to the posterior border of the tergum; a narrow dark stripe on the extreme edge of the carapace and at least upon the anterior half of the edge of the terga; the crests on the last sternum and on the lower side of the tail lightly infuscate; chelæ, legs, and tail uniformly pale. Closely resembling *C. elegans* in structure, but with the hands thinner, as wide as brachium, and a more distinct subaculear tooth. Pectinal teeth 17–18.

♂. Like the male of *C. elegans* in sexual characters; fifth caudal segment narrower than the first, a little wider than high. Hands a little wider than brachium. Pectinal teeth 21–22.

Measurements in mm.—♀. Total length 45, carapace 4, tail 24; width of hand 1·5. ♂. Total length 50, carapace 4·5, tail 30·5.

Hab. Mexico, Jalisco, north of the Rio de Santiago (*Schumann*).

5. **Centruroides subgranosus.** (Tab. VI. figg. 4, 4 *a*, *b*, ♀.)

Centrurus subgranosus, Kraepelin, Jahrb. Hamb. Wiss. Anst. xv. p. 44 (1898)[1]; Das Tierr., Scorpiones et Pedipalpi, p. 90 (1899)[2].

♀. About the same form and size as *C. elegans*, but nearly uniformly yellowish-brown, there being at most indistinct traces of a median and lateral pale spot separated by a slightly darker patch; legs, tail, and chelæ uniformly yellowish-brown. Granulation of *trunk* finer and closer than in *C. elegans*, and, as in that species, with lateral keels traceable as a pair or more of serially-arranged granules. *Sterna* as in *C. elegans*, but the fourth with the keels less well developed, but still traceable. *Tail* about five and a

half times as long as carapace, which equals its fourth caudal segment in length; its subaculear tooth longer than in *C. elegans*. *Chelæ* as in the latter.

♂. Apparently resembling that of *C. vittatus*, being described as very slender, with the fifth segment rounded at the sides, with the inferior lateral crests very feebly developed, and the vesicle three times as long as wide and almost cylindrical.

Measurements in mm.— ♀. Total length 46, carapace 4·5, tail 28.

Hab. Central America [1].

The description of the female given above is taken from one of the co-typical examples received by the British Museum from Prof. Kraepelin. Although he describes the species as "einfarbig gelbroth," and as having no trace of keels on the fourth sternal plate, nevertheless the abdominal bands characteristic of *C. elegans* and crests on the sternum in question are distinctly traceable in this specimen.

6. Centruroides bertholdi.

Centrurus bertholdi, Thorell, Atti Soc. Ital. Sci. Nat. xix. p. 158 (1877) [1].

♂. *Colour*: upperside of trunk uniformly fuscous or subferruginous, tail a little paler towards the extremity; legs and chelæ also uniformly coloured and paler than the trunk. Upperside of *trunk* thickly granular, the granules not forming definite series; the tergites with short lateral crests. *Sterna* smooth, coriaceous laterally, the last with four crenulated crests, and very finely granular in front and laterally, and with a large granule on each side between the keels and side margin. *Tail* very long and narrow, about eight times as long as the carapace, which is shorter than its first segment, and about one-third the length of the fourth + the fifth, fifth segment more than three times as long as broad and high, first about twice as long as wide, third about three times as long as wide; the surface very finely coriaceous, all the keels on segments 1–4 normally granulate; fifth segment almost smooth, with the superior edges widely rounded, the keels at most represented by very minute granules, the lower keels weak; vesicle ovato-cylindrate, about twice as long as wide; a slender conical subaculear tooth. *Chelæ* normally keeled, very finely granular above; hand wider than brachium, the keels granular; movable finger with eight rows of teeth. *Pectinal teeth* 26–27.

Measurements in mm.—Total length 79·5, carapace 6·5; tail 51·5, its first segment 7, second 8·5, fifth 10·3; vesicle and aculeus 6·5.

Hab. Mexico [1].

Judging by the description, this species, of which the male alone has been described, differs from the rest of the uniformly-coloured Mexican forms in the extreme length of its tail, which is almost eight times as long as the carapace, with its first segment exceeding the latter in length. In some respects it approaches *C. margaritatus*, but is smaller, has the granules of the carapace not serially arranged, and the tail longer and paler at the posterior end, instead of darker; nor can the hand of *C. margaritatus* be said to be furnished above with three granular keels running on to the immovable finger.

According to Kraepelin, *C. bertholdi* is based upon the male of *C. granosus*, Thorell. There appear to me to be grave reasons for doubting this. At all events, no great weight can be attached to Kraepelin's opinion on this point, considering that the male of the species from Curaçoa he determined as *C. granosus* ♀ + *C. bertholdi* differs from *C. bertholdi*, Thor., in having no subaculear tooth, the carapace longer than the first

caudal segment, half the length of the sum of the first and second, more than one-seventh the length of the tail, the superior keel on the hand practically smooth, &c. (*cf. infra*, p. 32, where *C. granosus*, Thor., is further discussed).

7. **Centruroides nitidus.** (Tab. VI. figg. 5, 5 *a*, *b*, ♀ ♂.)

Centrurus nitidus, Thorell, Atti Soc. Ital. Sci. Nat. xix. p. 152 (1877)[1]; Kraepelin, Jahrb. Hamb. Wiss. Anst. viii. p. 129 (1891)[2]; Pocock, Journ. Linn. Soc., Zool. xxiv. p. 390 (1893)[3].

Centrurus tenuis, Thorell, loc. cit. p. 153[4].

Centrurus republicanus, Karsch, Mittheil. Münch. ent. Ver. iii. p. 120 (1879)[5].

♀. *Colour* much as in *C. elegans*, the terga with a pair of black bands as in that species; the carapace not banded nor mesially infuscate, the lower side of the tail with a broad, median, black band, sometimes complete, sometimes failing on the first and fifth, more rarely on the fourth segment; chelæ and legs uniformly yellowish-brown, but the fingers black, at least in the basal half, where they are much darker than the hand. Upperside of *trunk* finely and closely granular, studded with coarser granulation, the terga without lateral granular crests. *Sterna* as in *C. elegans*, the third and fourth finely coriaceous, the fourth with scarcely a trace of crests. *Tail* parallel-sided, more than four times as long as carapace, the first segment as wide as the fifth, the third as long as the carapace, the fourth slightly longer, the intercarinal spaces finely granular or almost smooth, the sides of the segments more convex than in *C. elegans*; the fifth segment as high as wide, scarcely twice as wide as long; vesicle almost as high as wide, without a spine beneath the aculeus. *Chelæ* finely granular, with coarsely granular crests on humerus and brachium; the latter thicker than in *C. infamatus*, its width much more than one-third, nearly one-half, of its length; hand also very broad, its width about half the length of the movable finger, the keels on its upperside strong but smooth; movable finger with eight rows of teeth, barely one-third longer than the length of the underhand. *Pectinal teeth* 17–21.

♂. Coloured like the female. *Tail* from seven and a half to eight times the length of the carapace, parallel-sided or slightly expanded posteriorly, the fifth segment from two and a half to over three times as long as wide. *Hands* longer than in female, the underhand almost as long as the carapace. *Pectinal teeth* up to 25.

Measurements in mm.— ♀. Total length 62, carapace 6, tail 37; width of hand 3·5, of brachium 2·5; length of underhand 5, of movable finger 6·8. ♂. Total length 68, carapace 6, tail 49; width of hand 3, of brachium 2·2; length of underhand 5·5, of movable finger 7.

Hab. Mexico, Vera Cruz[2].—Antilles, Haiti[1–5], Puerto Rico[2].

The original examples of *C. nitidus*, *C. tenuis*, and *C. republicanus* were from Haiti, whence the British Museum also has specimens of the species. The British Museum has additional examples ticketed "Brazil," a locality which is perhaps erroneous. The description here given has been taken from these specimens.

8. **Centruroides flavopictus.** (Tab. VI. figg. 6, 6 *a–d*, ♂ ♀.)

Centrurus flavopictus, Pocock, Ann. & Mag. Nat. Hist. (7) i. p. 387 (1898)[1]; Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 94 (1899)[2].

♀. *Colour*: upperside of trunk blackish or yellowish-brown, the last tergite paler, the others with a narrow median yellow stripe or spot and a marginal spot on each side; tail reddish-brown, deep blackish-brown beneath at its posterior end, vesicle paler than fifth segment; chelæ pale at base, humerus and brachium, especially the brachium, stained with brown; hands yellowish-red, much lighter in colour than the brachium; fingers black, much blacker than the hand, with pale tips. *Legs* yellow. *Carapace* and *terga* relatively finely granular, the former without serial arrangement of granules, the latter without a trace of lateral keels, except on the fifth and sixth plates; fourth sternal plate mesially carinate; fifth coriaceous, finely granular laterally, the keels granular or crenulate. *Tail* about five and a half times as long as

carapace, moderately stout, fourth segment twice as long as wide, and about as long as the carapace, the intercarinal spaces almost smooth, the sides and under surface of the fifth segment closely but weakly granular; all the crests normal, with pearly granulation; upperside of fifth higher than its superior lateral keel; no trace of median lateral keel on second segment; vesicle granular, with triangular subaculear tooth close to base of aculeus. *Chelæ* finely and closely granular or coriaceous; normally keeled; hand narrow, a little wider than brachium, the three finger-keels on its upperside evenly granular or crenulated, the external weak, the rest of the hand smooth; the underhand about half the length of the movable finger, which has a low basal lobe and eight rows of teeth. *Pectinal teeth* 20–22.

♂. *Tail* about six and a half times as long as carapace, which is considerably more than half the length of the sum of its first and second segments, and almost equal to the third; second segment slightly more than twice as long as broad, fifth about three times as long as wide, slightly higher than wide, with rounded superior lateral edges, the dorsal surface rising well above the weakly granular keel; vesicle evenly oval when viewed from below, without trace of lateral projection forming shoulder-prominence at base of aculeus. *Chelæ* much longer and stouter than in female; width of hand much exceeding that of brachium, length of underhand much more than half the length of the movable finger. *Pectinal teeth* 22.

Measurements in mm.—♀. Total length 62, tail 37, carapace 6·7; width of first caudal segment 3·5, length 4·2; width of fifth 2·8, length 7. ♂. Total length 69, carapace 7, tail 46; length of second caudal segment 7, width 3; length of fifth 9, width 3.

Hab. Mexico, Jalapa[1] (*Höge*).

Kraepelin[2] places *C. flavopictus* in close proximity to *C. margaritatus*, doubting apparently its specific distinctness; and Borelli [Boll. Mus. Torino, xiv. no. 338, p. 3 (1899)] goes a step further and declares it to be based upon the young of that species, an opinion which he supports by the presence of a pale narrow median band and lateral marginal spots in the young forms of the latter. This view, however, is quite untenable. When describing *C. flavopictus* I was well acquainted with the characters of the immature *C. margaritatus* and with the features in its coloration that Dr. Borelli mentions; but no specimens of *C. margaritatus*, whether young or old, that I have seen resemble *C. flavopictus* in having the basal half of the finger black, and contrasting forcibly with the pale yellowish-red hand, which is also much paler than the brachium. In *C. flavopictus*, again, the granulation is much finer, and there are no traces of coarse lineally arranged granules on the carapace; there are also differences in the number of pectinal teeth, the form and size of the subaculear tooth and of the vesicle in the male, and the granulation of the hand-keels. Lastly, the adultness of the typical specimens of the species is attested by the development of well-marked secondary sexual characters.

9. **Centruroides ochraceus.** (Tab. VI. figg. 7, 7 *a–d*, ♀ ♂.)

Centrurus ochraceus, Pocock, Ann. & Mag. Nat. Hist. (7) i. p. 386 (1898)[1]; Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 94 (1899)[2].

♀. *Colour*: upperside of trunk a deep uniform yellowish-brown; tail, legs, and chelæ uniformly ochre-yellow. *Carapace* and *terga* studded with coarse granules, which are arranged on the former in definite series and on the latter in the usual way, the lateral keels being apparent on all but the first and second tergites. *Sterna* smooth, third with only a few coarse punctures, fourth with weak crests, fifth very finely granular laterally, the four keels smooth, the laterals at most crenulate. *Tail* about five and a half times as long as carapace, which is equal to its fourth segment in length; third segment twice as long as wide, fifth

two and a half times as long as wide, as high as wide; intercarinal spaces of segments 1–4 almost smooth, the keels strong and with normal pearly granulation, the inferior medians smooth on the first, crenulate on second; fifth segment finely granular, its upper surface raised slightly above the superior lateral keel; vesicle slightly wider than high, weakly granular, subaculear tooth long, broad at base, slender and pointed apically; aculeus abruptly curved backwards from its base. *Chelæ* at most very finely granular; upper finger-keels on hand strong and smooth, inner finger-keel crenulate, rest of the hand smooth, with only a few weak granules on its inner surface; hand wider than brachium, which is three times as long as wide; width of hand less than half the length of the movable finger, which has a strong basal lobe and eight rows of teeth. *Pectinal teeth* 27.

♂. *Tail* nearly seven times as long as carapace, which is as long as its second segment, the latter twice as long as wide, fifth as high as wide and about four times as long as wide; vesicle long and narrow, narrowly elliptical when viewed from below, without trace of shoulder-prominences. *Hand* approximately as in female. *Pectinal teeth* 27–28.

Measurements in mm.— ♀. Total length 72, carapace 7·2, tail 42; width of first segment 3·5, length 4·8, length of eighth 8·8, width 2·8; width of hand 3, of brachium 2·3. ♂. Total length 67, carapace 6, tail 43; length of first segment 5, width 3, length of fifth 8·5, width 2+; width of vesicle 1·5.

Hab. Mexico, Yucatan (*coll. Keyserling* [1]), Temax in N. Yucatan (*Gaumer*).

Though resembling *C. margaritatus* in some respects, *C. ochraceus* may be at once distinguished by its uniformly yellowish-brown coloration, smaller size, very sparsely hairy chelæ, large subaculear tooth, and more abruptly bent aculeus. Again, in the male, the carapace is as long as the second caudal segment, whereas in the male of *C. margaritatus* it is much shorter, and the vesicle, when viewed from below, is narrowly elliptical, without shoulder-prominence, while in *C. margaritatus* it is parallel-sided and strongly shouldered.

10. **Centruroides margaritatus.** (Tab. VII. figg. 1, 1 *a–e*, ♂; 2, 2 *a*, *b*, ♀.)

Scorpio margaritatus, Gervais, Voyage de la Bonite, i. p. 281, Atlas, Aptères, t. 1. figg. 13–17 (1841) [1]; Ins. Apt. iii. p. 55 (1844) [2]; Arch. Mus. iv. p. 224 (1844) [3].

Centrurus margaritatus, Pocock, Journ. Linn. Soc., Zool. xxiv. p. 386 (1893) [4]; Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 93 (1899) [5]; Borelli, Boll. Mus. Torino, xiv. no. 338, p. 3 (1899) [6].

Scorpio edwardsii, Gervais, Arch. Mus. iv. p. 216, t. 11. figg. 13, 14 (1844) [7]; Ins. Apt. iii. p. 53 [8]; and in Castelnau's Expéd. dans l'Amér. du Sud, Myriap. et Scorp. p. 41, t. 1. figg. 1, 1 *a–c* (1859) [9].

Scorpio de geerii, Gervais, Arch. Mus. iv. p. 217, t. 11. figg. 16, 17 (1844) [10]; Ins. Apt. iii. p. 54 (1844) [11].

Centrurus de geerii, Thorell, Atti Soc. Ital. xix. p. 167 (1877) [12]; Kraepelin, Jahrb. Hamb. Wiss. Anst. viii. p. 133 (1891) [13].

Tityus carinatus, C. Koch, Die Arachn. xi. p. 2, fig. 851 (1845) [14].

Tityus macrurus, C. Koch, loc. cit. p. 16, fig. 859 [15].

Tityus ducalis, C. Koch, loc. cit. p. 38, fig. 869 [16].

Centrurus gambiensis, Karsch, Mittheil. Münch. ent. Ver. iii. p. 123 (1879) [17].

? *Centrurus granosus*, Thorell, Atti Soc. Ital. Sci. Nat. xix. p. 155 (1877) (nec *C. granosus*, Kraepelin) [18].

♀. *Colour* of upperside of trunk a rich deep reddish-brown, the last tergal plate generally paler; sterna paler, the posterior darker than the anterior; tail on its anterior segments yellowish, brownish posteriorly,

the lower side darker than the upper, and the keels darker than the intercarinal spaces; cheliceræ yellowish-brown; chelæ with humerus and brachium yellow; hand and fingers deep reddish-brown, much darker than the brachium, base of fingers the same colour as the hand, their distal extremities generally paler; legs yellowish. *Carapace* as long as the first $+\frac{1}{4}$ of the second caudal segment, about as long as the third; beset with coarse subserially arranged granules. *Terga* also coarsely granular, the interstices and anterior portion finely granular; lateral crests distinct and consisting of three or four granules. *Sterna* 1–4 smooth, except the subpectinal area of the first, which is finely granular; a pair of indistinct crests on the fourth; fifth sparsely granular, the keels strong, the laterals granular, the medians crenulate. *Tail* strong, about five and a half times as long as the carapace; the first segment slightly wider than the rest, about one-third or one-fourth longer than wide, fourth barely, fifth slightly more than, twice as long as wide; the keels strong and coarsely granular, the interstices scarcely or weakly granular, the fourth more so than the third, and the fifth much more so than the others; vesicle weakly granular, its width as great as that of the brachium, the subaculear tooth distinct in young specimens, but often quite small and tubercular in adults. *Chelæ* thickly studded with long hairs internally, with the intercarinal spaces scarcely granular; the keels of humerus and brachium coarsely granular; hand large, its width nearly equal to that of the underhand, equal to that of the third segment and half the length of the movable finger, the upperside furnished with a pair of strong, nearly smooth crests, the external more broken up into low tubercles than the internal; a few granules on the inner surface of the hand and a few on the outer side below the outer crest; movable finger with a strong lobe, furnished with eight rows of teeth (excluding the small apical row) and rather longer than the carapace. *Pectinal teeth* 25–30.

♂. Like the female in colour and granulation. *Tail* very long, about seven and a half times as long as the carapace, which above equals the first segment in length, and a little exceeds one-third of the length of the fourth + the fifth; the first segment a little more than twice as long as wide, the fourth three times as long as wide, the fifth rather more than that; the vesicle with subparallel sides, expanded or shouldered at the base of the aculeus, a small subaculear tooth. *Chelæ* a little longer than in the female; the hand narrower, its width about two-thirds the length of the underhand, less than half that of the movable finger, and equal to or slightly exceeding that of the first caudal segment. *Pectinal teeth* 27 to over 30.

Measurements in mm.—♀. Total length 96; length of carapace 10, of tail 58; width of brachium 3·5, of hand 5·5; length of underhand 6, of movable finger 10·5. ♂. Total length 101, carapace 8·8, tail 69; width of brachium 2·5, of hand 4·5; length of underhand 6·2, of movable finger 9·8.

Hab. NORTH AMERICA, California.—MEXICO, Presidio and Mazatlan (*Forrer*), Sierra Madre del Sur and Dos Arroyos in Guerrero (*H. H. Smith*), Cordova (*Mus. Brit.*), Yucatan (*Cuming*); GUATEMALA, near the city and Lanquin (*Stoll*); COSTA RICA (*Rogers*), Guadalupe and San José (*Tristan and Biolley*); PANAMA (*Cuming*), Punta de Sabana, Darien (*Festa*), San José in the Pearl Is.[18].—SOUTH AMERICA to Peru, Brazil, and Chile; JAMAICA.—W. AFRICA, Gambia, Sierra Leone.

This species has a wide range in Central and South America. In addition to numerous examples ticketed merely Central America or Mexico, the British Museum has others from the above-mentioned localities in that region, and also large numbers as well from Jamaica (*Elmsley, Peckham, and Cockerell*), and some ticketed California (*J. H. Gurney*). Southwards from Darien *C. margaritatus* runs into the mainland of Colombia—Ibaque (*Goudot, in Mus. Brit.*), Cartagena and Bogota (type of *Scorpio edwardsii*, teste *Gervais*[7]); into Ecuador—Guayaquil (*E. Whymper, in Mus. Brit.*), Chimborazo and Santa Rosa (*Simons, in Mus. Brit.*), and the island of Puna in the Gulf of Guayaquil, where, according to Gervais[1], the type of *C. margaritatus* was procured; thence southward into Peru (teste *Gervais*) and Chile, where, according to Gervais[10], the type of *Scorpio de geerii* was collected. Gervais also records

it from Brazil ; and, lastly, the species has been met with in West Africa—in Gambia (type of *C. gambiensis*) and Sierra Leone (*Surg.-Major Clements, in Mus. Brit.*). No doubt, however, its presence in Africa is attributable to artificial introduction through human agency in connection, perhaps, with the slave-trade—a supposition supported by the circumstance that the species in San José, Costa Rica, is common in the roofs of old houses, according to Tristan.

Centrurus granosus, Thorell [18], based upon a specimen from the island of San José, in the Gulf of Panama, is, I suspect, to be referred to the young of this species. There appears to be nothing in the description to discountenance this belief, and much to be found in its favour. The coarsely and serially granular carapace, the strong and smooth superior keels on the hand, the eight rows of teeth on the movable finger, the number of pectinal teeth (26–27), the presence of a moderately strong, conical, subaculear tooth, the flatness of the upperside of the fifth caudal segment and its squared lateral angles, the paler colour of the last abdominal somite, the darker tint of the underside of the fifth caudal segment, the blackish keels, the hands rather more deeply tinted (*paullo saturatius coloratis*) than the rest of the chelæ and the legs, with the fingers not infuscate—all these characters agree with those of *C. margaritatus* ; whereas the smaller size (54 mm. in total length, with the carapace 6 and the tail 32·5), the narrow hand, which is scarcely wider than the brachium ($2\frac{1}{3}$ mm.: $2\frac{1}{4}$ mm.), and the lightly lobate movable finger attest the immaturity of the type specimen. Lastly, it is significant that Thorell himself, who, curiously enough, did not recognize that *C. margaritatus*, Gervais, is the same species as the one that he identified as *C. de geeri*, compares *C. granosus* with *C. margaritatus* in the following words :—" Hæc species [*C. granosus*] *Scorp. margaritato*, Gerv., certe valde affinis est, sed verisimiliter diversa : in *C. margaritato*, secundum figuram a Cel. Gervais datam, costæ manuum fortiter granulosæ sunt, in nostra specie omnino sunt læves." As a matter of fact, the granulation of the keels in this figure is grossly exaggerated, as I have elsewhere [4] pointed out, so that the only difference between the two forms mentioned by Thorell falls to the ground.

Prof. Kraepelin appears to me to have fallen into errors in his identification of *C. granosus*—errors which careful perusal of Thorell's descriptions would have rendered impossible. He determines as *C. granosus* a species from Curaçoa and, as he alleges, from Barbados, which is uniformly coloured throughout, and has no subaculear tooth, quite ignoring Thorell's account of the coloration of the type of *C. granosus* and his statement as to the presence of a " *dens sat fortis, conicus*," beneath the aculeus.

11. **Centruroides gracilis.** (Tab. VII. figg. 3, 3 *a*, ♂ ; 4, 4 *a*, ♀ .)

Scopio australis, De Geer, Mém. etc. vii. p. 348 (1778) [1] [*teste* Thorell, Atti Soc. Ital. Sci. Nat. xix. p. 166 (1877)] (nec *Scorpio australis*, Linn.).

Scorpio gracilis, Latreille, Hist. Nat. Gén. Crust. et Ins. vii. p. 127 (1804) [2].

Centrurus gracilis, Karsch, Mittheil. Münch. ent. Ver. iii. p. 18 (1879) [3]; Kraepelin, Jahrb. Hamb. Wiss. Anst. viii. p. 131 (1891) [4]; Pocock, Journ. Linn. Soc., Zool. xxiv. pp. 385, 386 (1893) [5]; Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 92 (1899) [6].

Androctonus biaculeatus, Lucas, in Webb & Berthelot, Hist. Nat. Canar., Arachn. p. 45 (1835) [7].

Scorpio (*Atræus*) *biaculeatus*, Gervais, Ins. Apt. iii. p. 54, t. 23. fig. 1 (1844) [8]; Arch. Mus. iii. p. 218 (1844) [9]; and in Castelnau's Expéd. dans l'Amér. du Sud, Myriapodes et Scorpiones, p. 43, t. 2. fig. 4 (1859) [10].

Buthus biaculeatus, Wood, Journ. Acad. Nat. Sci. Philad. v. p. 366 (1863) [11] (part.).

Centrurus biaculeatus, Thorell, Atti Soc. Ital. xix. p. 166 (1877) [12].

Tityus mulatinus, C. Koch, Die Arachn. xi. p. 5, fig. 854 (1845) [13].

Tityus congener, C. Koch, loc. cit. p. 19, fig. 860 [14].

Tityus nebulosus, C. Koch, loc. cit. p. 25, fig. 862 [15].

Scorpio (*Atreus*) *sayi*, Girard, in Marcy's Rep. Red River, p. 269 (1853) [16].

Scorpio (*Atreus*) *nigrifrons*, Berthold, Nachr. Ges. Götting. 1846, p. 59 [17] (*teste* Kraepelin).

Centrurus heterurus, Karsch, Mittheil. Münch. ent. Ver. iii. p. 122 (1879) [18].

♀. *Colour*: carapace and terga deep reddish-black or brown, sterna paler but clouded with rich brown; tail yellowish-brown, paler than the terga, darker posteriorly and beneath; legs ochre-yellow; chelæ rather darker than the legs, the hand redder than the brachium, fingers nearly black with yellow tips; cheliceræ deep brown; coxæ, sternum, &c. pale. Upperside of *trunk* studded with coarse, shining, symmetrically arranged tubercles, an area extending obliquely forwards on each side of the median eyes and the interstices between the rows of coarse tubercles finely granular; anterior portion of terga finely and closely granular; carapace as long as the second caudal segment, a little shorter than the third or fourth, as long as brachium, rather longer than humerus. *Tail* about six and a half times as long as carapace, all the crests evenly granular, the interspaces at most very weakly granular; vesicle weakly granular below, slightly wider than high; subaculear spine well developed, triangular, its upper (anterior) edge lightly convex, the distance between it and the base of the aculeus exceeding the width of the base of the spine. *Sterna* shining, the second, third, and fourth coarsely punctured in the middle, the last very finely granular laterally, and furnished with four keels, the medians nearly smooth, anteriorly abbreviated, the laterals converging inwards posteriorly against the medians. *Chelæ* shagreened, the crests on humerus and brachium closely granular; hand with one complete weakly granular finger-keel, an incomplete keel close to it on the outer side; width of hand about one-third the length of the movable finger, and about two-thirds that of the underhand, which is almost half the length of the movable finger; the latter lobate at base, the immovable finger with corresponding shallow excavation, the movable with nine rows of teeth. *Pectinal teeth* 25–30.

♂. Smaller and slenderer than female. *Tail* much longer, about eight times as long as the carapace, which is scareely as long as the first segment, and about three-quarters the length of the second; vesicle with nearly straight sides and shouldered at base of vesicle on each side, its posterior surface much less convex. *Chelæ* a little longer than in female, the carapace a little shorter than the humerus. Pectinal teeth 30–36.

Measurements in mm.—♀. Total length 102, carapace 9·5; tail 62, caudal segments 1+2 (second 9·5) 18·5, fifth 12. ♂. Total length 118, carapace 9·5; tail 78, caudal segments 1+2 (second 12·5) 24, fifth 15.

Hab. MEXICO, Lake of Chalco, Yucatan (*coll. Keyserling, in Mus. Brit.*), Atoyac in Vera Cruz, Teapa in Tabasco (*H. H. Smith*), Temax in N. Yucatan (*Gaumer*); BRITISH HONDURAS (*Indo-Colonial Exhib.*), Stain Creek (*Robertson*); GUATEMALA, Panzos (*Conradt*), Salinas de Nueve Cerros, Rio Negro (*Sarg*). — VENEZUELA, Caracas; ANTILLES, Cuba, Jamaica.

This species is widely distributed throughout Central America. In addition to examples vaguely ticketed Mexico, the British Museum has representatives from the above-mentioned localities in that region, as well as others from Caracas (*Dr. Ernst*).

Under the name *C. heterurus*, which, according to Kraepelin, is a synonym of *C. gracilis*, Karsch has recorded it from Jamaica, Havana, Caracas, and Honduras.

When more material from the various localities is available for comparison, it is probable that many local races or subspecies will be discovered, especially when adults and young of both sexes are to hand for examination. For example, the above-described specimens from Honduras are alike in colour in the two sexes, as also are a number of specimens from Caracas. On the other hand, there is often considerable sexual diversity of colouring, the males having the legs bright yellow *.

12. Centruroides rubricauda.

Centrurus rubricauda, Pocock, Ann. & Mag. Nat. Hist. (7) i. p. 389 (1898) [1]; Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 93 (1899) [2].

Nearly allied to *C. gracilis*. Trunk, legs, and chelæ in female alike in colour and deep brown; chelæ of male also deep brown, with reddish hand as in female, but the legs uniformly clear yellow and contrasting strongly with the darker tint of the trunk; tail in both sexes a uniform deep reddish olive-brown, much lighter than the trunk; ventral surface deep blackish-brown in female, and with maxillary processes of first and second legs black, paler in male, with maxillary processes deeply infuscate at apices. *Carapace* in female longer than second or third, as long as fourth, and almost as long as fifth caudal segment, or as the movable finger. *Tail* about five and a half times as long as carapace; the crests granular, but the granules fewer in number and less closely set than in *C. gracilis*, there being only about 20 along the inferior lateral keel of the fifth as opposed to about 25 or 30 in *C. gracilis*, and from 15 to 19 on that of the third segment as opposed is 25 in *C. gracilis*; vesicle shaped much as in the latter, but the aculeus more abruptly bent backwards from the base; in the male also the vesicle is more parallel-sided, with the shoulders more pronounced and rectangular and less sloping. *Chelæ* as in *C. gracilis*, but the crests much less strongly granular. *Pectinal teeth* 20–21, ♀; 21–23, ♂.

Measurements in mm.—♀. Total length 80, carapace 8·5; tail 51, second segment 7·3, fifth 9. ♂. Total length 103, carapace 9; tail 71, second caudal segment 11·3, fifth 13·3.

Hab. Costa Rica, Managua (*Dr. Rothschuh* [1] [2]).

* *Notes on synonymy.*—Latreille was the first to point out that the scorpion from America, identified by De Geer as *Scorpio australis* of Linnæus, is specifically distinct from that species; and by an examination of De Geer's type Thorell established its probable identity with the form described by Lucas as *S. biaculeatus*. I have followed Kraepelin in regarding *Centruroides mulatinus* and *C. congener*, two Mexican forms, as referable to this species rather than to *C. margaritatus* on the strength of the blackness of the fingers as compared with the hand and the rest of the chelæ; but this feature, it must be remembered, is common to all the species with nine rows of teeth on the fingers. No locality is known for *C. nebulosus*, which is also included on account of its black fingers. The species described as *Atreus sayi* by Girard, and based upon examples from Pensacola in Florida, Wood declared to be specifically identical with *C. biaculeatus*. This opinion may be correct; but since Wood includes *S. edwardsii* and *S. de geerii* in his synonymy of *C. biaculeatus*, his verdict is open to suspicion. Moreover, he points out that the Florida specimen differs in certain structural points from more southern examples. This, if true, attests, at least, a subspecific distinctness between the two. Kraepelin's inclusion of *C. nigrifrons* of Berthold, the type of which was from Popayan in Colombia, is presumably justified by an examination of the original specimens in the Gottingen Museum.

13. **Centruroides bicolor.** (Tab. VII. figg. 5, 5 *a*, ♂.)

Centrurus bicolor, Pocock, Ann. & Mag. Nat. Hist. (7) i. p. 388 (1898)[1]; Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 93 (1899)[2].

Colour alike in the two sexes; carapace and upperside of abdomen mostly black, yellowish-brown in parts, the last tergite yellowish-brown with black keels; sterna yellowish-brown, blackish on the margins (and in the middle in the female); tail darkening posteriorly, its first four segments deep ochre-yellow, paler than the pale areas on the trunk, the granules on the keels black, the inferior keels more diffused with black; fifth segment with its sides and under surface blackish; vesicle blackish, red above like the upperside of the fifth segment; mandibles infuscate; chelæ yellow for the most part, a blackish spot at the tip of the brachium, the hand deep reddish-brown with black keels, fingers blackish with pale tips; legs a rich yellow like the humerus and brachium, with the maxillary processes of first and second pairs apically infuscate; pectines pale. *Carapace* and *terga* granular, as in *C. gracilis*; *sterna* also as in that species, but the third more thickly pitted mesially, and the fourth and fifth finely and closely granular mesially as well as laterally, the second and third also very weakly granular mesially. *Tail* and *chelæ* practically as in *C. gracilis*. In the male the caudal keels are smoother than in *C. gracilis*, those on the fifth segment being almost entirely smooth, and the vesicle is more globular and more uniformly sloped on each side of the aculeus. *Pectinal teeth* 26–28, ♀; 28–29, ♂.

Measurements in mm.— ♀. Total length 109, carapace 10; tail 63, second segment 9·5, fifth 11·8. ♂. Total length 120, carapace 11; tail 82, second segment 13, fifth 15.

Hab. Costa Rica, Pozo Azul de Pirris, Atlantic slope (*Zeledon*[1]), Santo Domingo de Golfo Dulce, in the straw of old roofs (*Pittier*[1]), Carillo (*Underwood*); Panama, Chiriqui.

14. **Centruroides limbatus.** (Tab. VIII. figg. 1, 1 *a*, ♂.)

Centrurus limbatus, Pocock, Ann. & Mag. Nat. Hist. (7) i. p. 387 (1898)[1]; Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 92 (1899)[2].

Allied to the foregoing, but strikingly different in colour; carapace and terga yellow or reddish with black margins, ocular tubercle black, cheliceræ yellow at base, infuscate apically; first four segments of tail uniformly yellow, with granules on keels darker, fifth segment and vesicle deep blackish-brown; sterna entirely yellow, with blackish side margins, and in female clouded with black mesially; legs entirely yellow, including apices of maxillary processes; chelæ entirely yellow, except the digits, which are black with pale tips. Granules on *trunk*, *tail*, and *chelæ* much finer than in *C. bicolor*; sterna granularly coriaceous as in that species. *Pectinal teeth* 22–23, ♀; 25, ♂.

Measurements in mm.—Total length 100, carapace 9; tail 70, second segment 11, fifth 12·5. Another specimen (♂) measures 125 mm. The only known female of this species is young, and measures 66 mm. in total length.

Hab. Costa Rica, Sirires in Talamanca (*Pittier*[1]), Sipurio in Talamanca (*Cherrie*).

15. **Centruroides nigrimanus.**

? *Scorpio* (*Atræus*) *edwardsii*, Gervais, Arch. Mus. Paris, iv. p. 217 (in note) (1844)[1].

Centrurus nigrimanus, Pocock, Ann. & Mag. Nat. Hist. (7) i. p. 388 (1898)[2]; Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 93 (1899)[3].

♂. Resembling the male of *C. bicolor* in colour, but more coarsely and closely granular above, the fifth caudal segment having its crests very distinctly granular, and its interstices also granular, whereas in *C. bicolor* this segment is almost entirely smooth throughout; vesicle very different in form from that of *C. bicolor*, being strongly compressed antero-posteriorly, its height equal to the width of the humerus (in *C. bicolor* its height is considerably greater than the width of the humerus), flat behind, parallel-sided, and laterally pitted, the aculeus more abruptly bent backwards from the base, and the subaculear tooth very

close to its base, and with its apex turned towards the aculeus, the distance between the two being less, or at least not greater, than the basal width of the tooth. *Legs* more coarsely granular externally than in *C. bicolor*. *Pectinal teeth* 32–33.

Measurements in mm.—Total length 110, carapace 9·5; tail 76, second segment 12·5, fifth 15.

Hab. Mexico, Oaxaca (*Mus. Brit.*[1]); Honduras (*Indo-Colonial Exhib.*[1]).

It is highly probable that the specimen from Oaxaca in the Paris Museum recorded by Gervais[1] as a very distinct variety of *Scorpio* (*Atræus*) *edwardsii*, Gerv., is referable to this species.

16. **Centruroides nigrescens.** (Tab. VIII. figg. 2, 2 *a*, ♀; 3, 3 *a*, ♂.)

Centrurus nigrescens, Pocock, Ann. & Mag. Nat. Hist. (7) i. p. 389 (1898)[1]; Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 93 (1899)[2].

Colour alike in both sexes, and differing from that of all the species closely related to *C. gracilis* in being of a uniform blackish-green on the upperside of the trunk, the tail, legs, and chelæ, the tarsi only and the distal half of the fingers being, however, pale; coxæ and sternal plates mesially yellowish-brown; pectines flavous. Upperside of *trunk* coarsely and closely granular. *Sterna* smooth and polished, not coriaceous or granular, except the fifth. *Tail* with all the keels coarsely granular in the female, less so in the male; vesicle in male of the same shape as in *C. nigrimanus*; in female the subaculear tooth equally close to the base of the aculeus. *Pectinal teeth* 25–27, ♀; 28–30, ♂.

Measurements in mm.—♀. Total length 85, carapace 8·5; tail 53, second segment 8, fifth 10·5. ♂. Total length 107, carapace 8·8; tail 73, second segment 11·5, fifth 14.

Hab. Mexico, Xautipa and Amula in Guerrero, Orizaba (*H. H. Smith*[1]).

17. **Centruroides fulvipes.** (Tab. VIII. figg. 4, 4 *a*, ♀.)

Centrurus fulvipes, Pocock, Ann. & Mag. Nat. Hist. (7) i. p. 390 (1898)[1]; Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 93 (1899)[2].

♀. Structurally resembling *C. nigrescens*, but totally different in colour, the trunk brownish-black above, the last tergite paler than the others; tail blackish posteriorly and beneath, the upperside of the first, second, and third segments reddish-brown; chelæ with trochanter and humerus yellow; brachium, hand, and base of fingers blackish-brown, nearly the whole of the fingers deep brown; legs and coxæ reddish-yellow, maxillary processes not infuscate. *Pectinal teeth* 28–29.

Measurements in mm.—Total length 83, carapace 8·5; tail 52, second segment 7·5, fifth 10.

Hab. Mexico, Xautipa in Guerrero[1 2] (*H. H. Smith*).

RHOPALURUS.

Rhopalurus, Thorell, Ann. & Mag. Nat. Hist. (4) xvii. p. 9 (1876); Atti Soc. Ital. Sci. Nat. xix. p 83 (1877); Karsch, Mittheil. Münch. ent. Ver. iii. p. 18 (1879). (Type *R. laticauda*.)

Heteroctenus, Pocock, Journ. Linn. Soc., Zool. xxiv. pp. 385, 391 (1893). (Type *H. junceus*.)

Centrurus, Kraepelin, Jahrb. Hamb. Wiss. Anst. viii. p. 119 (1891); Das Tierr., Scorpiones et Pedipalpi, p. 87 (1899).

Resembling *Centruroides* in the dentition of the fingers of the chelæ, but differing in having the tail in the female a little wider in its posterior than in its anterior half, and in the male much wider than in the female. The first sternal plate of the abdomen is marked with a pair of grooves, which are much deeper than in *Centruroides*, and run forwards and inwards from the inner edge of the stigmata to meet close behind the anterior border of the sternum, and form the inner boundary of a depressed area upon

which the pecten rests (Tab. VIII. fig. 5 *a*). The pectines a little or very much wider in the basal than in the distal half, and frequently there is a strong median lateral keel on the second and a weaker one on the third caudal segment.

Type *R. laticauda*.

Distribution. Cuba, Haiti, Central America, and the northern parts of South America.

Of the five species referred by me to this genus all differ from *Centruroides* in the thickness of the tail in the female, and its greater expansion in the male than in the former sex. Apart from this character, the structural features of the genus are exemplified in the greatest perfection in the Brazilian species, *R. borellii*, sp. n., which possesses the median lateral keel on the second and third caudal segments, strongly expanded pectines, and on the first abdominal sternum deep grooves which pass inwards from the stigmata, and then turn abruptly forwards in a direction nearly parallel with each other, enclosing a narrow, slightly raised area which ends on the anterior border of the sternum in a blunt point. Two species, namely *R. junceus* (Herbst) and *R. agamemnon* (Koch), resemble *R. borellii* in the structure of the pectines and the shape and depth of the sternal grooves, but have not acquired the median lateral crests upon the second and third caudal segments; whereas, on the other hand, the remaining two species, *R. laticauda* and *R. princeps*, which possess the supernumerary keel, have the pectines only a little broader basally than in *Centruroides*, and the sternal grooves approaching those of that genus, being shallower than in the remaining three species, and running obliquely forwards from the stigmata to meet in an acute angle. *R. borellii*, in fact, occupies a central position, with *R. junceus* and *R. agamemnon* approaching *Centruroides* on the one side and *R. laticauda* and *R. princeps* on the other.

Only one species of the genus has been recorded from Central America.

1. **Rhopalurus junceus.** (Tab. VIII. figg. 5, 5 *a*, ♀; Tab. IX. figg. 1, 1 *a*, ♂.)

Scorpio junceus, Herbst, Nat. ungeflügelt. Ins. iv. p. 65, t. 3. fig. 2 (1800) [1].

Heteroctenus junceus, Pocock, Journ. Linn. Soc., Zool. xxiv. p. 392 (1893) [2].

Centrurus junceus, Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 94 (1899) [3].

Scorpio (*Atreus*) *hemprichii*, Gervais, Ins. Apt. iii. p. 54 (1844) [4]; Arch. Mus. Paris, iv. p. 218, t. 11. fig. 18 (1844) [5].

Scorpio hemprichii, Lucas, in Ramon de la Sagra's Hist. Nat. Cuba, Crust. et Ins. p. lxx, Atlas Anim. Artic. t. 5. figg. 5–5 *c* (1851) [6]; Gervais, in Castelnau's Expéd. dans l'Amér. du Sud, Myriap. et Scorpiones, p. 41, t. 1. figg. 2, 2 *a*, *b* (1859) [7].

Rhopalurus hemprichii, Karsch, Mittheil. Münch. ent. Ver. iii. p. 119 (1879) [8].

Centrurus hemprichii, Kraepelin, Jahrb. Hamb. Wiss. Anst. viii. p. 135 (1891) [9].

♀. *Colour* a tolerably uniform deep yellowish-brown; the tail darker posteriorly, especially beneath; fingers black with yellow tips. *Carapace* coarsely granular, the granules subserially arranged at the sides. *Terga* also coarsely granular, without trace of lateral keel. *Sterna* smooth, except quite at the sides; the smooth depressed lateral area of the first smooth, the last finely granular, with four strong weakly

subtubercular crests; at the anterior extremity of the lateral keel on the outer side are some small tubercles forming a short transverse crest. *Tail* about five and a half times as long as carapace, which is slightly longer than the fourth, and shorter than the fifth segment, the inferior and lateral intercarinal spaces rather coarsely granular, the anterior segments sparsely so, the posterior thickly; upperside of first, second, and third, and in a lesser degree of the fourth segment finely and closely granular in the middle, the granular area broader behind; all the keels coarsely granular, the inferior and superior lateral posteriorly denticulated, indications only of a median lateral keel on the second segment; first segment slightly wider than the second, a little narrower than the third, which equals the fifth, fourth the widest of all; upperside of fourth excavated, of fifth with a median groove; fourth rather more than one-third wider than long, fifth less than twice as wide as long; vesicle granular, as wide as the brachium, a little wider than high; no subaculear tooth. *Chelæ* very finely granular; crests strongly granular; hand shagreened, scarcely keeled, its width exceeding that of the brachium, and about three-fourths the length of the underhand, which is about half the length of the movable finger; the latter exceeding the fifth caudal segment, with a strong basal lobe, and furnished with eight median rows of teeth. *Pectines* very broad at the base, furnished with from (16) 17–19 teeth.

♂. *Tail* only slightly longer than in female, but much thicker; fourth segment almost as wide as long, fifth segment only one-third wider than long, and as wide as the fourth or wider. *Chelæ* with hand very wide, its width nearly equal to length of underhand, and half the length of the movable finger; the two fingers in contact only in the distal third of their length, proximally strongly arched away from each other so as to leave a long and wide space between them.

Measurements in mm.— ♀. Total length 104, carapace 11·5; tail 66, width of first segment 6·5, of fourth 7, length of first 8, of fourth 11; width of brachium 4, of hand 5·5; length of underhand 7, of movable finger 14. ♂. Total length 98, carapace 11; tail 63, width of first segment 6·5, of fourth 8·5, length of first 7·5, of fourth 10; width of brachium 4, of hand 6·6; length of underhand 7·3, of movable finger 13·3.

Hab. Mexico (*Mus. Brit.*).—Brazil; Cuba; Haiti.

The description given above is taken from adult specimens in the British Museum, which are ticketed Mexico, and belonged originally to Keyserling's collection. The Museum also has examples labelled Brazil. These localities require confirmation.

The only authentic localities known for the animal are Cuba and Haiti.

ISOMETRUS.

Isometrus, Hempr. & Ehrenb. Symb. Phys., Scorpiones (1828); also of Thorell, Karsch, Simon, Pocock (prior to 1891), Kraepelin [Jahrb. Hamb. Wiss. Anst. viii. p. 244 (1891)], and of subsequent authors.

Differing from the following genus, *Tityus* (p. 39), in that the fingers of the chelæ are furnished with only about five or six rows of teeth set end to end without overlapping, also with an inner series consisting of six large teeth set close to the apices of the median rows, and an outer series of large teeth corresponding to those of the inner series, and placed in a straight transverse line with them.

Type *I. europæus*, Linn. (*Scorpio*).

Distribution. Confined to the Oriental region, and ranging from India as far as Queensland, with the exception of the type-species, which has been transported by commerce into almost all tropical countries.

1. **Isometrus europæus.**

Scorpio europæus, Linn. Syst. Nat. ed. 10, p. 625 (1758) [1].

Isometrus europæus, Lönnberg, Ann. & Mag. Nat. Hist. (7) i. p. 86 (1898) [2]; Pocock, Fauna British India, Arachn. p. 46 (1900) [3].

Scorpio maculatus, De Geer, Mém. Hist. Ins. vii. p. 346, t. 41. figg. 9, 10 (1778) [4].
Lychas maculatus, C. L. Koch, Die Arachn. xii. p. 1, fig. 960 (1845) [5].
Isometrus maculatus, Thorell, Ann. & Mag. Nat. Hist. (4) xvii. (1876) [6]; Simon, Ann. Mus. Genova, xx. p. 370 (1884) [7]; Oates, Journ. Bomb. Nat. Hist. Soc. iii. p. 250, figg. 3, 4 (1888) [8]; Kraepelin, Jahrb. Hamb. Wiss. Anst. viii. p. 245 (1891) [9]; Das Tierr., Scorpiones et Pedipalpi, p. 66 (1899) [10].
Scorpio dentatus et *americanus*, Herbst, Nat. ungeflügelt. Ins. iv. pp. 55, 60, t. 6. figg. 2, 3 (1800) [11].
Lychas americanus, C. L. Koch, Die Arachn. xii. p. 1, fig. 961 (1845) [12].
Buthus (*Isometrus*) *filum*, Hempr. & Ehrenb. Symb. Phys., Scorp. p. 3, t. 1. fig. 3 (1828) [13].
Scorpio (*Atreus*) *filum*, Gervais, Ins. Apt. iii. p. 52 (1844) [14].
Lychas paraensis, C. L. Koch, Die Arachn. xii. p. 6, fig. 963 (1845) [15].
Scorpio (*Lychas*) *gabonensis*, Lucas, in Thomson's Arch. Ent. ii. p. 430, t. 12. fig. 8 (1858) [16].
Scorpio (*Lychas*) *guineensis*, Lucas, op. cit. p. 432, t. 12. fig. 9 (1858) [17].

Colour yellow varied with black, frontal area of carapace with a triangular yellow patch; terga marked posteriorly with five black spots separated by six clear yellow spots; tail, legs, and chelæ spotted or lined with black. *Carapace* about as long as the first and half the second caudal segments, or as long as the fourth. Upperside of *trunk* evenly granular; *sterna* smooth, the last finely granular, with four granular crests. *Tail* slender, about five and a half times as long as carapace, evenly granular. *Chelæ* granular; hand keelless, scarcely as wide as brachium; underhand less than half the length of the movable finger, which is longer than the carapace.

♂. *Tail* very long, about eight times as long as carapace; fourth segment about one and a half times as long as carapace. *Chelæ* long and slender; hand slender, parallel-sided, its width about one-third the length of the underhand, which is at least two-thirds the length of the movable finger. *Pectinal teeth* 17–19 (♂ ♀).

Measurements in mm.— ♀. Total length 49, carapace 5, tail 28, underhand 2·5, movable finger 6. ♂. Total length 62, carapace 5, tail 42, underhand 4·5, movable finger 7.

Hab. ? Central America.—Tropical South America; Antilles, &c.

Although this species has not been actually recorded from Central America, there can be little doubt as to its occurrence in or near the seaport towns of that country, since it has been noticed in most of the West-Indian Islands, and in various parts of South America, as well as in Africa, India, Spain, &c.

TITYUS.

Tityus, C. L. Koch, Die Arachn. iii. p. 33 (1836) (part.); Pocock, Journ. Linn. Soc., Zool. xxiv. p. 376 (1893); Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 69 (1899).
Isometrus (part.), Thorell, Ann. & Mag. Nat. Hist. (4) xvii. p. 8 (1876); Karsch, Mittheil. Münch. ent. Ver. iii. p. 18 (1879); Pocock, P. Z. S. 1890, p. 119.
Phassus, Thorell, Ann. & Mag. Nat. Hist. (4) xxii. p. 8 (1876); Kraepelin, Jahrb. Hamb. Wiss. Anst. viii. p. 107 (1891).
Androcottus, Karsch, Mittheil. Münch. ent. Ver. iii. p. 11 (1879).

Fingers of the chelæ furnished with many rows of teeth largely overlapping each other, so that the distal extremity of each row, which has an enlarged terminal tooth, lies on a level with the middle of the series distal to it (Tab. IX. fig. 6 *a*).

In all the Central-American species the base of the pecten is furnished with a smooth and rounded lobe in the female, and the males have the chelæ either longer or stouter and the tail longer than in the female.

Type *T. bahiensis*, Perty (*Scorpio*).

Distribution. Neotropical Region; Central America and the West Indies, over the whole of South America as far south as Argentina.

Key to the Species.

a. Inferior median keels on segments 2 and 3 of tail uniting posteriorly, and completely fused on segment 4 . . . . . *androcottoides*, Karsch.

b. Inferior median keels on segments 2–4 of tail separated and parallel.

*a*¹. Subaculear tooth represented by an inconspicuous tubercle. Lateral and inferior surfaces of the posterior caudal segments covered with coarse, close-set, shining granules; variegated in the adult . . . . . *crassimanus*, Thor.

*b*¹. Subaculear tooth represented by a large triangular bitubercular spike; lateral and inferior surfaces of the tail at most weakly and scantily granular; adult uniformly black.

*a*². Pecten with smooth, rounded, basal lobe; carapace slightly longer than third caudal segment . . . . . *cambridgei*, Poc., ♀.

*b*². Pecten without basal lobe; carapace noticeably shorter than third caudal segment.

*a*³. Hand slender, concave externally, its width equal to one-third the length of the underhand and to that of the brachium, which is four times as long as wide . . . . . *cambridgei*, Poc., ♂.

*b*³. Hand thick, not concave externally, its width exceeding half the length of the underhand, and much greater than that of the brachium, which is three times as wide as long . . . . *festæ*, Bor., ♂.

1. **Tityus cambridgei.** (Tab. IX. figg. 2, 3, 3 *a*.)

Tityus cambridgei, Pocock, Ann. & Mag. Nat. Hist. (6) xix. p. 360 (1897)[1]; op. cit. pp. 517, 518[2]; Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 78 (1899) (where a long list of doubtful synonyms is appended)[3]; Borelli, Boll. Mus. Torino, xiv. no. 338, p. 1 (1899)[4].

Hab. GUIANA; AMAZONS, Pará.

Subsp. *championi*.

Tityus championi, Pocock, Ann. & Mag. Nat. Hist. (7) i. pp. 384, 385 (1898)[5]; Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 81 (1899)[6].

♂. *Colour* in adult tolerably uniform black or blackish-brown, generally paler on the chelæ and tail; tarsi, pectines, and a triangular patch in the middle of the posterior border of the third sternal plate pale yellow. *Carapace* and *terga* finely granular, some coarser granules on the sides and frontal area of the carapace, and others forming ill-defined frontal and posterior keels; a row of coarse granules along the posterior border of the terga, a single median and a pair of transverse keels; the last tergum with a pair of strong granular crests on each side and a short anterior crest. *Sterna* finely granular anteriorly, smooth along the posterior border and in the middle behind; the last granular throughout, with four weakly granular crests. *Tail* long, about six and a half times as long as the carapace, which is scarcely as long as the second segment, shorter than the third, and about one-third the length of the first three segments; fourth and fifth segments slightly wider than the first; anterior caudal segments finely granular, posterior almost smooth, all the keels, except the inferior medians of the fourth, which are practically obsolete,

weakly granular; vesicle weakly granular, with a large, triangular, bitubercular, subaculear spine; first caudal segment about one-third longer than wide, second about twice as long as wide, fifth twice and a half as long as wide. *Chelæ* finely granular, with granular keels; anterior keel of the brachium irregularly denticulate; brachium longer by one-third of its length than the carapace, and at least four times as long as wide; hand scarcely as wide as the brachium, the underhand concave, almost as long as the carapace, and about three times as long as the width of the hand; keels on the hand almost obsolete; *fingers* long, the movable with a weak basal lobe, longer by one-third of its length than the carapace, and furnished with fifteen rows of teeth. *Legs* finely granular, crested. *Pectines* with only a small basal lobe and 19–20 teeth.

♀. Like the male in colouring, but with the tail shorter, less than six times as long as the carapace, with the keels more strongly granular; the fourth segment as long as the carapace, the third about twice as long as wide, the first segment a little wider than the fourth or fifth. *Chelæ* shorter and stouter than in male; the brachium twice and a half as long as wide; hand as wide as the brachium, lightly convex externally, globular internally, distinctly crested above and externally; the underhand less than twice as long as the width of the hand, and a little less than half the length of the movable finger, which is more strongly lobate than in the male. *Pectines* with 20 teeth, and a large, smooth, subcircular, basal lobe.

Measurements in mm.— ♂. Total length 85, carapace 8; tail 56, its first segment 10; length of brachium 12·5, width 2·3; length of underhand 7·5, width of hand 2; length of movable finger 12·5. ♀. Total length 75, length of carapace 7·5, of tail 45, of brachium 7·5; width of brachium 3, of hand 3; length of underhand 4·5, of movable finger 10.

Hab. Costa Rica, Cerros de los Carrones, Buvica (*Pittier*); Panama, Bugaba (*Champion*), forest along the Rio Cianati and on the shores of Lake Pita, Darien (*Dr. Festa*).

On the label accompanying the specimen collected by H. Pittier is the information that the species is to be met with "In damp places under dried leaves."

The typical form of *Tityus cambridgei* occurs at Pará, near the mouth of the Amazons, where examples (♂ ♀) were collected by Messrs. F. O. P. Cambridge and E. E. Austen. From the Amazons the species ranges northwards into Surinam, whence the British Museum has received examples (♂ ♀) obtained on the Upper Surinam River by Mr. C. W. Ellacombe, and from Surinam to Ecuador and Panama. The Surinam and Panama scorpions, however, differ from the southern form in certain characters which justify the view as to the subspecific distinction of the two.

The differences may be tabulated as follows:—

a. Keels on the hand standing out as sharply defined, finely granular crests; intercarinal spaces of the tail, especially in the female, very distinctly and closely granular throughout, the keels more coarsely granular; hand in the female thinner, narrower than the brachium, its width about half the length of the underhand; inferior median keels on the fourth caudal segment in the male distinct and granular . . . . . *cambridgei*, Poc., typical form.

b. Keels on the hand weaker and smooth; intercarinal spaces of tail obsoletely granular, the keels less strongly granular; hand in the female as wide as brachium, its width much more than half the length of the underhand; inferior median keels on the fourth caudal segment in the male obsolete and smooth . . . . . Subsp. *championi*, Poc.

The above-given description of this subspecies is taken from adult male and female specimens from the Rio Cianati, Darien, kindly lent to me for the purpose by Dr. A. Borelli.

A comparison of the female with the type of *Tityus championi*, Poc., from Bugaba, Panama, convinces me that the two are conspecific, and that the supposedly specific characters of the latter are due to immaturity. In most structural points the two are practically alike, the chief differences being the absence of the pectinal lobe, the thinner hand, more granular caudal keels, and the variegated coloration of the type of *T. championi*.

The adult male, as described above, is a tolerably uniform deep blackish-brown colour, with scarcely a trace of paler spots, except on the posterior angles of the terga. The female, on the contrary, which, although adult, is rather smaller, is distinctly redder than the male, especially on the tail and chelæ, and the terga exhibit a distinct angular yellow spot and four smaller less distinct spots on the posterior margin on each side of the middle line. The type of *T. championi* is smaller still and very considerably paler, the prevailing coloration being yellowish-brown with darker mottling; the legs are indistinctly annulated, the chelæ are reddish-yellow with very indistinct pale spots, the fingers being blackish with yellow tips; three dark bands are traceable on the terga, and the posterior yellow spots on these plates are very distinct; the sides of the caudal segments are paler in the middle than in front and behind, and the vesicle and lower side of the fifth segment are nearly black. Its measurements are as follows:—Total length 62 mm., tail 39, carapace 6·5; width of hand 2·5; length of underhand 4·5, of movable finger 9. In a second, but much smaller, specimen from Bugaba measuring 30 mm., with the carapace 3, and the tail 18, the variegated coloration traceable in the type is much more pronounced, the specimen closely resembling in colour the species of *Tityus*, typified by *T. columbianus*, *T. silvestris*, &c. It is noticeable that the humerus and brachium are palely fuscous with yellow spots, and that the clear yellow hand contrasts strongly with the fuscous tint of the fingers, which have clear yellow tips. This species, in short, is prettily variegated with black and yellow in its young stages, and gradually assumes a darker hue as it approaches maturity, becoming ultimately, when adult, almost entirely black. It is highly probable that all the numerous allied species pass through similar stages of coloration.

2. **Tityus festæ.** (Tab. IX. fig. 4.)

Tityus festæ, Borelli, Boll. Mus. Torino, xiv. no. 338, pp. 1–3 (1899) [1].

♂. Resembling the male of *T. cambridgei* in colour and most structural points, but with the caudal crests much more coarsely granular, the inferior crests of the fourth segment distinctly granular; the first segment as wide as the fourth. *Chelæ* much shorter and the hand broader; the brachium only a little longer than the carapace, and about three times as long as wide; the hand much wider than the brachium, its width more than half the length of the underhand, the latter much more than half the length of the movable finger; the movable finger about as long as the fifth caudal segment, longer by one-fourth of its length than the carapace, both fingers strongly lobate, but not widely separated at base. *Pectinal teeth* 20–21.

Measurements in mm.—Total length 83, carapace 8; tail 54, its fifth segment 10; length of brachium 9, width 3; width of hand 4; length of underhand 6·2, of movable finger 10·5.

Hab. PANAMA, Tintin in Darien (*Dr. Festa* [1]).

This description and figure are taken from the typical and only known example kindly lent to me by Dr. Borelli.

3. **Tityus androcottoides.** (Tab. IX. figg. 5, 5 *a–c.*)

Isometrus americanus, var. *androcottoides*, Karsch, Mittheil. Münch. ent. Ver. iii. p. 113 (1879) [1].

Isometrus androcottoides, Pocock, Ann. & Mag. Nat. Hist. (6) iv. p. 57 (1889) [2].

Phassus americanus (Linn.), Kraepelin, Jahrb. Hamb. Wiss. Anst. viii. p. 113 (1891) [3] (part.); Thorell, Bull. Soc. Ent. Ital. xxv. p. 371 (1893) [4].

Tityus androcottoides, Pocock, Journ. Linn. Soc., Zool. xxiv. p. 377 (1893) [5] (excl. examples from Trinidad); Ann. & Mag. Nat. Hist. (6) xix. p. 514 (1897) [6]; Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 77 (1899) [7].

♀. *Colour* of trunk above and below tolerably uniform deep brownish-black or reddish-brown, chelæ redder, with black yellow-tipped fingers, pectines and tarsi yellow; in smaller forms the legs are mottled, and there are traces of spots on the terga. *Carapace* granular, with coarsely granular keels, about as long as the third caudal segment, a little shorter than the brachium. *Terga* coarsely granular, with median granular keel, the anterior overlapped area finely granular. *Sterna* finely but thickly granular throughout, except the subpectinal area of the first, which is nearly smooth; a nearly smooth narrow ridge on the second, third, and fourth, that on the third expanding posteriorly into a smooth triangular area, the last with four coarsely granular keels. *Tail* nearly six times as long as the carapace, slender, nearly parallel-sided; the first segment about one-third longer than wide, second not quite twice as long as wide, third twice as long as wide, fourth and fifth more than twice as long as wide; the intercarinal spaces finely and closely granular, the upperside more finely so than the sides and lower surface; all the keels well developed, and evenly and coarsely granular; median lateral keel present only on the first segment; the two inferior median crests on the first distinct, but inwardly geniculate towards the posterior ends; on the second extending throughout the anterior half of the segment, but behind that point replaced by a median keel which extends for a short distance forwards between the two, and posteriorly bifurcates into a right-angled triangle; on the third segment the pair of keels is present only on the anterior fifth of the under surface, the median keel occupying the rest of the area, and not so distinctly bifurcated as on the second; on the fourth the paired keels are only represented by three or four granules, the median keel extending practically throughout the length of the segment; fifth segment with squared edges; vesicle granular below, wider than high, and as wide as the brachium or hand, with a strong, triangular, subaculear tooth. *Chelæ* finely and closely granular, with coarsely granular keels; hand as wide as brachium, its width barely two-thirds the length of the underhand, which is less than half that of the movable finger; upperside of hand coriaceous, the finger-keels weakly granular or crenulate, the external finger-keel completely divided; fingers long and slender, the movable long and slender, much longer than the fifth caudal segment. *Legs* finely granular, granularly crested. *Pectines* with 16–17 teeth and conspicuous basal lobe.

♂. Resembling the female, except in the greater length of the tail and chelæ. *Tail* more than seven times as long as the carapace, which is about equal to its first segment, the latter rather more than twice as long as wide, the fourth about four times as long as wide; vesicle also longer than in the female. *Chelæ* with humerus and brachium distinctly longer than carapace; hand wider than brachium, its width scarcely more than half the length of the underhand, which is more than half the length of the movable finger; the latter resembling that of the female. *Pectinal teeth* 18.

Measurements in mm.—♀. Total length 73, carapace 7; tail 44, width of first segment 3·5, of fifth 3·2; length of brachium 8, width 2·6; width of hand 2·8; length of underhand 4, of movable finger 9·8,

♂. Total length 80, carapace 7; tail 55, width of first segment 3, of fifth 2·8; length of brachium 8·8, width 2; width of hand 2·5; length of underhand 5, of movable finger 9.

Hab. Panama[1] (*Mus. Brit.*).—Guiana, Demerara.

Although Kraepelin gives Venezuela as a doubtful locality for this species, it has only been previously recorded with certainty from Demerara, whence the British Museum has several examples. The above-given description is taken from an adult male and female collected in Demerara by Mr. W. L. Sclater.

In general appearance *T. androcottoides* closely resembles *T. cambridgei*, but differs essentially in the fusion of the inferior keels of the second, third, and fourth caudal segments, as well as in the secondary sexual characters of the male.

4. **Tityus crassimanus.** (Tab. IX. figg. 6, 6 *a–c*.)

Isometrus crassimanus, Thorell, Atti Soc. Ital. Sci. Nat. xix. p. 129 (1877) [1].
Phassus crassimanus, Kraepelin, Jahrb. Hamb. Wiss. Anst. viii. p. 111 (1891) [2].
Tityus crassimanus, Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 76 (1899) [3].

♂. *Colour* yellowish-red, mandibles infuscate; carapace with a triangular fuscous interocular area and a black margin; terga with three black patches, one median divided by a spot on the keel, and one on each side midway between the lateral border and the median patch, these patches constituting three longitudinal black bands; ventral surface yellow, the last sternum infuscate posteriorly; tail yellowish above, darker posteriorly, the underside of the segments spotted with black, the fourth and fifth segments deep blackish-brown, vesicle reddish-brown; legs and chelæ mottled with black; hands reddish, fingers black with yellow tips. *Carapace* somewhat coarsely granular, with granular crests on the ocular tubercle; shorter than the first, about as long as the second caudal segment, and as long as the brachium. *Terga* also beset with somewhat coarse shining granules. *Sterna* finely granular, the posterior more so than the anterior, a smooth area on the posterior third of the first, second, third, and fourth, the fifth granular throughout, with four granular keels. *Tail* a little more than six times as long as the carapace, expanded posteriorly, the first segment one-fourth longer than wide, second, third, fourth, and fifth almost twice as long as wide; vesicle wide, much wider than the brachium, its width much more than half the length of the latter; the superior caudal keels weak, the rest normally developed and granular; sides and lower surface of tail studded with coarse shining granules, which, on the fourth and fifth segments, are very numerous and close-set or even confluent; upperside of fifth, and in a lesser degree of fourth segment, granular; vesicle studded with low squamiform granules, subaculear spine reduced to a minute tubercle. *Chelæ* granular above, with coarsely granular keels; brachium scarcely more than twice as long as wide; hand shining, granular, especially internally, crested, very wide, the width equal to that of the fourth caudal segment, and almost equal to the length of the underhand, and to about half the length of the movable finger; the latter, like the immovable, strongly lobate and furnished with 14–15 rows of teeth. *Pectines* with 18–20 teeth.

Measurements in mm.— ♂. Total length 65, carapace 6; tail 40, width of first segment 3·5, of fifth 4; length of brachium 6, width 2·5; width of hand 3·8; length of underhand 4·3, of movable finger 7.

Hab. Mexico.

The above characters are taken from a dried unlocalized male specimen in the British Museum. This individual, however, agrees closely in all essential points with Thorell's and Kraepelin's description of *T. crassimanus*. According to Kraepelin, the female has a rounded lobe at the base of the pecten as in *T. cambridgei*. The

examples examined by this author, moreover, have the legs and chelæ yellowish-red, and the crests on the fifth sternum scarcely granular. They attained a length of 80 mm.

The following scorpion has been recorded by Gervais from Mexico, but the identification must be regarded as doubtful. The recognition of the differences between the various species allied to such forms as *T. cambridgei*, *T. festæ*, and *T. androcottoides*, especially in the case of the female sex, requires considerable powers of discrimination and analysis, and a large number of specimens from various localities for comparison and study. Hence the Mexican example determined by Gervais as *T. obscurus* may be referable to either of the three just mentioned, and may or may not belong to the genuine *T. obscurus*, which was from Cayenne.

Tityus obscurus.

Scorpio (*Atreus*) *obscurus*, Gervais, Arch. Mus. iv. p. 249 (1844) [1]; Ins. Apt. iii. p. 55 (1844) [2]; and in Castelnau's Expéd. dans l'Amér. du Sud, Myriap. et Scorp. p. 42, t. 1. figg. 3, 3 *a*, *b* (1859) [3].

Hab. Mexico (*Parzudacki*).—Colombia; Guiana.

This species was based on a female from Cayenne. Gervais also records it from Colombia.

Except for the statement that *T. obscurus* possesses twenty-two pectinal teeth, there is nothing in the description that serves to differentiate this species from the females of almost all the many allied forms. That Gervais himself certainly confused more than one form under the name *S. obscurus* is attested by his determination of a Colombian specimen with only fifteen pectinal teeth, now in the British Museum, as that species.

Order PEDIPALPI.

The Central-American genera of this Order fall into two Suborders, which may be diagnosed as follows:—

a. Carapace longer than broad; chelæ forming a pair of stout pincers, their basal segments fused in the middle line; legs of first pair with only the terminal segment subdivided, basal segments of second and third pairs meeting or almost meeting in the middle line; abdomen elongate, its last three segments narrowed to form a caudal support for a long many-jointed postanal flagellum . . . . Urotricha.

b. Carapace wider than long; chelæ not pincer-like, being without digitiform prolongations; legs of first pair with their three distal segments forming a long many-jointed lash, those of the second and third pairs widely separated basally by the sternal area; no postanal flagellum, and the last three abdominal segments not narrowed to form a caudal prolongation . . . . . Amblypygi.

Suborder UROTRICHA.

Fam. THELYPHONIDÆ.

Same characters as for the suborder.

Distribution. Oriental Region from Japan in the north and India in the west to the Western Pacific Islands in the south-east; Sonoran and Neotropical Regions in America.

MASTIGOPROCTUS.

Thelyphonus of authors up to 1894.

Mastigoproctus, Pocock, Ann. & Mag. Nat. Hist. (6) xiv. p. 130 (1894); Kraepelin, Abh. Ver. Hamb. xv. p. 36 (1897); Das Tierr., Scorpiones et Pedipalpi, p. 223 (1899).

Carapace with a crest running forwards on each side in front of the lateral eye-clusters; median eyes separated by a low ridge and looking obliquely upwards and outwards. Maxillary processes of *chelæ* without tooth on inner edge. Secondary sexual characters slightly developed; chelæ in male longer than in female, with the spines on the trochanter modified and the tibial apophysis thinner. Female with the segments of the tarsus of the first leg unmodified and like those of the male. Sternum of first abdominal segment with a pair of shallow depressions; of second also with a pair of depressions and bearing a transverse crescentic crest immediately behind the generative orifice. In the male the sternum of the first abdominal segment inflated laterally, the pits prolonged into a couple of oblique furrows; no median sulcus; second abdominal sternum without any median spine or crest.

Type *M. giganteus,* Luc.

Distribution. From Florida, Texas, and Arizona, southwards into the West Indies (Haiti, Martinique), and through Central America into South America as far south as the Argentine Republic.

Synopsis of the Central-American Species.

a. Upper and outer sides of all the segments of the chela smooth, polished, and sparsely punctured; tibia of second and third legs without apical spur beneath . . . . . *liochirus,* Poc.

b. Upper and outer sides of all the segments of the chela densely rugose with granules and close-set punctures; an inferior apical tibial spine upon the second, third, and fourth legs . . . . . *giganteus,* Luc.

a^1. Outer side of femur and of proximal half of tibia of chela rugose, spines on the trochanter subequal in male . . . . . *giganteus* (typical form).

b^1. Outer side of femur and proximal half of tibia of chela denticulate.

a^2. Spines on trochanter of chela in male much reduced. *giganteus,* subsp. *mexicanus,* Butl.

b^2. Anterior spine on trochanter in male very large . . *giganteus,* subsp. *scabrosus,* n.

1. **Mastigoproctus giganteus.** (Tab. X. figg. 1–4, ♀ ♂.)

Thelyphonus giganteus, Lucas, Mag. Zool. v. Cl. viii. t. 8 (1835)[1]; C. L. Koch, Die Arachn. x. p. 21, fig. 768 (1842)[2]; Wood, Journ. Ac. Philad. (2) v. p. 373 (1863)[3]; Butler, Ann. & Mag. Nat. Hist. (4) x. p. 205 (1872)[4]; Marx, Proc. Ent. Soc. Wash. i. p. 42 (1886)[5].

Mastigoproctus giganteus, Pocock, Ann. & Mag. Nat. Hist. (6) xiv. p. 130 (1894)[6]; Kraepelin, Abh. Ver. Hamb. xv. p. 37 (1897)[7]; Das Tierr., Scorpiones et Pedipalpi, p. 224 (1899)[8].

Thelyphonus excubitor, Girard, in Marcy's Rep. Red River, p. 265, t. 17. figg. 1–3 (1853) (♂)[9].

Thelyphonus rufus, Butler, Ann. & Mag. Nat. Hist. (4) x. p. 205 (1872) (♀)[10].

Thelyphonus mexicanus, Butler, loc. cit. p. 201, t. 13. fig. 1[11].

♀. *Colour* uniformly blackish or reddish-brown, the ventral surface and the extremities of the appendages paler reddish-brown. *Carapace* coarsely granular, especially posteriorly; the cephalic region coarsely rugose. *Chelæ* with coxæ rugose, pitted, granular laterally; trochanter denticulate in front, armed below with 2 spines and above with 6—3 inner, 2 anterior, and 1 (the largest) on the angle, the external of the two anterior spines small, often nearly obsolete; femur armed above with 1 shorter and below with 1 longer spine, coarsely granular above, below, and externally, the granules on the outer surface often denticuliform; tibia granular above and below and coarsely pitted externally, the apophysis with the anterior edge denticulated throughout its length, the posterior edge with two denticles at the distal end; hand coarsely pitted and granular, its inner edge and that of the immovable finger denticulate, armed below with two spines; the opposable edges of the two fingers bluntly denticulated. Femur of first *leg* sparsely granular, of the remaining pairs coarsely and closely granular, smoother on the inner side, denticulate distally beneath; a single apical spine on the underside of the tibiæ of the second, third, and fourth pairs. *Sterna* mostly smooth, very finely punctulate and marked with scattered larger punctures, the first, second, and third granular at the side, the first also thickly and finely granular in front.

♂. Smaller than the female; the two inferior spines on the trochanter of the chela reduced in size; those on the upperside 5 in number—2 on the inner side, 1 on the angle, and 2 on the anterior side, the latter close together and remote from the angular spine, which is not produced forwards in advance of them; femur and tibia of chela not externally denticulated; tibial apophysis thinner than in female, not or scarcely denticulated posteriorly at the distal end; immovable finger of chela more strongly convex than in female; the mouth with a distinct apical prominence below the terminal claw.

Measurements in mm.—♀. Total length (not including flagellum) 74, carapace 25, chela (excluding coxa) 32; length of hand 6·5, width 6; femur of first leg 16, tibia 21. ♂. Total length 56, carapace 21, chela 34; length of hand 8·5, width 6; femur of first leg 14, tibia 18.

Hab. North America, San Diego in Texas, Florida.—Mexico (*Mus. Paris*[1]), Mazatlan, Sinaloa, Cordova (*Höge*), Guadalajara, Jalisco (*Schumann*), Guanajuato (*Dugès*), Xautipa, Amula, and Omilteme in Guerrero (*H. H. Smith*), Atoyac, Playa Vicente, Oaxaca (*Mus. Brit.*).

Of female and young examples identified comprehensively as *M. giganteus* I have seen about fifteen examples from Mexico, and the British Museum also has others from San Diego, Texas (*Taylor*).

Three forms of the male of this species are distinguishable:—

a. The form described above, in which the five spines on the upper edge of the trochanter of the chela are subequally developed, the anterior two being separated from each other and not markedly produced anteriorly; the upperside of the trochanter is pitted, but only obsoletely granular, and the outer side of the femur is not denticulated, merely rugose. (Tab. X. fig. 2.) . . . . . *giganteus*, Luc. (typical form).

This is the form that Girard characterizes from the Red River under the name *Thelyphonus excubitor*, and it is probably the typical *M. giganteus*. The British Museum has examples of it ticketed "Mexico" (*Keyserling coll.*), and others from Atoyac in Vera Cruz.

b. A larger form than the preceding, with the upperside of the trochanter of the chela coarsely granular, and the femur of the chela studded externally with sharp denticuliform granules or tubercles; the two anterior spines on the upper edge of the trochanter are united basally, the external (which is the smaller) rising from the internal, which is much stronger than the rest of the spines on this segment. (Tab. X. fig. 4.) . . . . . Subsp. *scabrosus*, n.

The British Museum has two males of this subspecies—one, the type, from Oaxaca; the other labelled "Playa Vicente, Mexico."

c. A small form with the two anterior spines on the upperside of the trochanter of the chela almost obsolete, the two internal small, the angular alone being prominent but small; the external surface of the femur and of the base of the tibia of the chela are coarsely denticulated. (Tab. X. fig. 3.) . . . . . Subsp. *mexicanus*, Butl.

The British Museum has two males of this subspecies—the type, which is merely ticketed "Mexico," and another from "Ciudad" (*Rogers*). In the bottle with the last there is a small female which has the chela externally more scabrous and subdenticulate than the female I refer to *M. mexicanus*.

2. **Mastigoproctus liochirus.** (Tab. X. fig. 5.)

Mastigoproctus liochirus, Pocock, Ann. & Mag. Nat. Hist. (7) v. p. 299 (1900)[1].

Colour: carapace and abdomen blackish, chelæ and legs reddish-brown. *Carapace* and *terga* less coarsely granular than in *M. giganteus*. *Chela* with coxa almost smooth; trochanter armed as in the female; spine on upper edge of femur minute, on the lower side small; tibial apophysis long, as in the male of *M. giganteus*, smooth along its posterior edge, but with 1 subapical denticle and 1 close to its base on the tibia, anterior edge of the apophysis denticulated; inner edge of hand denticulated from the base up to the tip of the immovable finger, 1 spine on the lower side of the hand close to the base of the movable finger, which has denticulated edges and no process beneath the terminal fang; the whole of the upper and outer sides of the segments of the chela smooth, polished, sparsely punctured and quite unlike the appendages in *M. giganteus*; hand as wide as long, its inner edge compressed as in the female of *M. giganteus*. *Sterna* smooth and polished, without granules. *Legs* without an apical tibial spine upon the second and third pairs.

Measurements in mm.—Total length 36, carapace 13, chela 28·5.

Hab. GUATEMALA (*Sarg*).

This species is based upon a single specimen, which, to judge by the length of the chela, is probably a subadult male. The genital operculum (sternum of first abdominal segment) is unmodified, but is furnished on its underside near the edge with a pair of horny black crests, such as are seen in subadult specimens. The second abdominal sternum is also unmodified.

Suborder AMBLYPYGI.

Fam. PHRYNIDÆ.

Tarantulinæ, Simon, Ann. Soc. Ent. Fr. lxi. p. 46 (1892); Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 240 (1899) (part.).

Neophryninæ, Kraepelin, Abh. Ver. Hamb. xiii. p. 20 (1895) (part.).

Admetinæ, Pocock, Ann. & Mag. Nat. Hist. (6) xix. p. 358 (1897) (part.).

Sternal area of cephalothorax mostly membranous, the two mesosternal plates small and oval, the prosternal plate gradually narrowed from base to apex, not abruptly expanded at its basal extremity. Fourth leg with its tibia composed of three and its tarsus of four segments.

The sexes may be recognized without difficulty. Beneath the genital operculum in the male there is a pair of soft, muscular, weakly chitinized, indistinctly bisegmented, apically bifid organs which probably act as penes. When the operculum is raised these organs protrude from the aperture. In the female, on the contrary, there are no such organs beneath the operculum, but a pair of rounded membranous eminences affixed to the inner surface of the operculum, each bearing a pointed, inwardly directed, chitinous, claw-like sclerite. Furthermore, the males have the legs and chelæ a little, or considerably, longer than in the females.

This family is confined to the tropical and warmer temperate parts of America. It is divisible into two subfamilies :—

a.	Trochanter (second segment) of second appendage (chela or palpus) not furnished beneath with a subcylindrical chitinous process lying back against the coxa	PHRYNINÆ.
b.	Trochanter of second appendage furnished beneath with a subcylindrical process lying back against the coxa. (See Tab. XII. fig. 1 *a*, *ap*.)	HETEROPHRYNINÆ, nov.

Subfam. *PHRYNINÆ*.

Characters as above.

Distribution. From Central America northwards into Lower California and Texas, eastwards over all the islands of the Greater and Lesser Antilles to the Bahamas, and southwards into the northern parts of South America as far down as the Amazons.

The three genera referable to this subfamily may be diagnosed as follows :—

a.	Anterior border of carapace armed with long spiniform processes; protarsal segment (hand) of the chela furnished with a single upper and lower long spine	ACANTHOPHRYNUS, Kraep.
b.	Anterior border of carapace armed with small denticuliform processes or almost smooth; protarsal segment of chela furnished, at least above, with more than the one long spine.	
a'.	Tibia of the chela armed above with two longish spines between the two principal longest spines	HEMIPHRYNUS, Poc.
b'.	Tibia of chela armed above with only *one* long spine between the two principal longest spines	PHRYNUS, Lam.

PHRYNUS.

Tarantula, Fabr. Ent. Syst. ii. p. 43 (1792) (part.) ; Karsch, Arch. f. Naturg. xlv. 1, p. 197 (1879) (part.) ; Pocock, Ann. & Mag. Nat. Hist. (6) xiv. p. 275 (1894) ; Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 241 (1899).

Phrynus, Lamarck, Hist. Anim. sans Vert. p. 175 (1801) (part.) ; Latreille, Hist. Nat. Crust. et Ins. iii. p. 48 (1802) ; Pocock, Ann. & Mag. Nat. Hist. (7) ix. p. 161 (1902). (Type *palmatus*, Herbst.)

Admetus, C. Koch, Uebersicht Arachn. Syst. v. p. 81 (1850) (ad max. part.) ; Simon, Ann. Soc. Ent. Fr. lxi. p. 51 (1892) ; Pocock, Ann. & Mag. Nat. Hist. (6) xix. p. 358 (1897). (Type *palmatus*, Herbst.)

Neophrynus, Kraepelin, Abh. Ver. Hamburg, xiii. p. 23 (1895). (Type *palmatus*, Herbst.)

Anterior border of carapace at most weakly denticulate. Femur of chela armed above and below only with marginal spines ; tibia armed above with 7–9 spines, two of which are noticeably longer than the rest, and are separated by one long spine, which is about three-quarters the length of the others ; hand armed above with 2 or 3 spines, and below with 3 spines and 1 long spine and a proximal and distal spinule. Proximal tarsal segment of legs partially divided by a membranous subjoint into two segments.

Type *Phalangium palmatum*, Herbst (1797).

Distribution. Texas, Central America, West Indies, and South America north of the Amazons.

Synopsis of the Species.

a. Subfrontal process not concealed from above by the anterior border of the carapace ; lateral ocular cluster nearly twice as far from the median tubercle as from the lateral border ; trochanter of chela with a strong spine in the middle of its anterior surface ; first spine on upperside of hand isolated from the base of the median spine ; first spine on upperside of femur of chela long and strong . . . . . *barbadensis*, Poc.

b. Subfrontal process concealed from above by the anterior border of the carapace ; lateral ocular cluster at most a little further from the median tubercle than from the lateral border ; no strong median spine in the middle of the anterior surface of the trochanter of the chela ; first spine on upperside of hand represented by a small denticle situated upon the base of the long median spine ; first spine on upperside of femur of chela small.

a^1. Second spine on tibia of chela about as long as the fourth and longer than the sixth ; no distinct yellow spot on inner side of lateral eyes.

a^2. Area between eyes not red ; femora not spotted, anterior border of carapace nearly straight ; genital operculum enormous and sternum of third abdominal somite arcuate in male . . . . . *operculatus*, sp. n.

b^2. Area between eyes reddish ; legs not spotted ; femora and anterior border of carapace distinctly emarginate ; genital operculum in male small ; sternum of third abdominal somite straight . . . . . *parvulus*, sp. n.

b^1. Second spine on tibia of chela much shorter than the fourth, and shorter than the sixth ; a distinct bright yellow spot on the inner side of each lateral eye-cluster . . . . . *whitei*, Gerv.

1. **Phrynus barbadensis.** (Tab. X. figg. 6, 6 *a*, *b*, ♂.)

Tarantula barbadensis, Pocock, Journ. Linn. Soc., Zool. xxiv. p. 529, t. 40. fig. 1 (1893) [1]; Ann. & Mag. Nat. Hist. (6) xiv. p. 278 (1894) [2].

Tarantula palmata barbadensis, Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 244 (1899) [3].

Neophrynus palmatus, var. *barbadensis*, Kraepelin, Abh. Ver. Hamburg, xiii. p. 33 (1895) [4].

Colour: carapace a uniform deep brown, passing into black, with four ill-defined marginal yellow spots; abdomen pale brownish-yellow or more frequently dark brownish-black variegated with yellow, a patch of this colour being particularly noticeable round the muscular pit, which is black. *Carapace* very finely granular, with some larger granules sparsely scattered; anterior border lightly emarginate, denticulate, not concealing the subfrontal process, which visibly projects downwards between the bases of the mandibles; the median tubercle about half its own longitudinal diameter from the edge; lateral eye-clusters wide apart, each cluster further from the median tubercle than from the anterior margin, nearly twice as far from the tubercle as from the lateral margin above the base of the anterior leg, and nearer to the latter point than to the anterior margin; median length of carapace about equal to length of tibia of chela and a little less than twice that of femur of first leg; width of carapace equal to length of tibia + protarsus + $\frac{1}{2}$ the tarsus (claw) of chela and about two-thirds the length of the femur of the first leg and equal to the femur of the second leg. These proportions are approximately true for both sexes. *Chelæ* short and robust, the trochanter armed in front with 5 strong spines; femur armed above and below with 5 strong spines and at least 2 smaller spines, the third inferior spine about as long as the fourth and always noticeably longer than the fifth, and the first on the upperside half the length of the second; tibia armed above with 8 spines, the distal of which is quite small; the second about two-thirds the length of the third and as long as the fourth or fifth; the longest of these spines less than the width of the tibia; the lower side of the segment armed with 5 spines—the first, third, and fifth short and subequal, much shorter than the second and fourth, which are long and also subequal; protarsus (hand) armed above and below with 3 spines, the first and third on the lower side small, sometimes spinuliform; the first on the upperside small but remote from the base of the median long spine, the third longer, about half the length of the second; femur of chela coarsely granular above and below; tibia finely shagreened, but sparsely and weakly granular, its lower side bordered externally by a strong granular ridge; outer side of hand smooth. *Legs* granular. *Abdominal terga* shagreened, beset with coarse granules, a row of which runs along the posterior border; genital operculum in male rather large, exceeding the length of the sternal area of the carapace; sternal area of third abdominal somite straight from side to side.

Measurements in mm.—Total length 19; width of carapace 11, median length 7; femur of chela (upperside) 5, tibia 7·5.

Hab. Panama, San José in the Pearl Is. (*fide Kraepelin*).—Colombia; Venezuela; Trinidad; Barbados.

2. **Phrynus parvulus,** sp. n. (Tab. X. figg. 7, 7 *a*, *b*, ♂.)

Resembling *P. barbadensis* in general form, but more conspicuously variegated, the carapace ornamented with pale reddish patches on each side of the middle line, and the area between the eyes red; terga yellow along the posterior border, and with a large crescentic yellow patch round the muscular impressions. *Carapace* with its coarser granules more numerous, its frontal area narrower, the anterior border more deeply emarginate, concealing the frontal process; ocular tubercle at least its own diameter from the anterior border; lateral ocular clusters closer together, each cluster standing about equally distant from the median tubercle and from the lateral emargination above the base of the first leg and further from the anterior border than from the median tubercle. *Chelæ* of much the same length and form as in *P. barbadensis*, but more granular, the inner surface being beset with fine close granulation, the trochanter armed with only 4 spines, all of which except the inferior are small; the third spine on the lower side of the femur small, much shorter than the fourth, and only as long as the fifth; the basal spine on the upperside of the hand subtubercular and rising from the base of the median spine, not independently of

it as in *P. barbadensis*; the spines on the lower side longer, the first or proximal arising close to the base of the median, which it almost touches, and from which it diverges at an acute angle. *Genital operculum* in male small, its length about equal to that of the circular sternal area of the cephalothorax and much less than that of the upperside of the femur of the chela. Sternal area of third abdominal somite straight from side to side.

Measurements in mm.—Total length 16, width of carapace 8·5, median length 6; length of genital operculum 2, width 3.

Hab. GUATEMALA, ruins of Tikal, Peten (*Sarg*).

I have seen, in all, seven specimens of this species in the Godman and Salvin collection. Three of these are adult males, one an adult ovigerous female, and the rest about half or three-parts grown. The smallest measures about 8 mm. in length.

3. **Phrynus operculatus,** sp. n. (Tab. X. figg. 8, 8 *a–c*, ♂.)

Closely allied to *P. parvulus*, but darker in *colour*, there being no red upon the interocular area on the carapace, and no yellow spots upon the femora of the legs. The anterior border of the *carapace* is almost straight, and the lateral ocular clusters are about equidistant from the anterior border, from the lateral border above the base of the first leg, and from the median tubercle. The third spine upon the inferior edge of the femur of the *chela* is subequal to the fourth, and longer than the fifth, and the first spine upon the lower side of the hand is isolated from the base of the median spine and pointing in the same direction. Apart from these distinguishing features, which are found in both sexes, the male of *P. operculatus* differs from that of *P. parvulus* in the great size of the *genital operculum*, the length of which far exceeds that of the circular sternal area of the cephalothorax, and is almost equal to the length of the femur of the chela. Correlated with the enlargement of this plate the sternal area of the second somite shows almost a semicircular curvature, and that of the third is also curved and encroaches upon the sternum of the fourth segment.

Total length 13 mm., width of carapace 9; length of genital operculum (♂) 4, width 5·5.

Hab. GUATEMALA (*Sarg*).

An adult male and female in the Godman and Salvin collection.

4. **Phrynus whitei.** (Tab. XI. figg. 1, 1 *a–c*.)

Phrynus whitei, Gervais, Journ. l'Inst. Soc. Phil. Paris, x. p. 72 (1842) [1]; Ins. Apt. iii. p. 6 (1844) [2].

Tarantula whitei, Pocock, Ann. & Mag. Nat. Hist. (6) xiv. p. 277, t. 7. figg. 4, 4 *a* (1894) [3]; Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 243 (1899) [4].

Neophrynus whitei, Kraepelin, Abh. Ver. Hamb. xiii. p. 28 (1895) [5].

Colour: carapace blackish, with yellow rim, yellowish radiating spots, and a bright yellow-red patch on the inner side of each lateral ocular cluster; abdomen variegated, femora of legs spotted. *Carapace* with sparsely arranged coarse granules, the anterior border covering the subfrontal process, lightly emarginate, median ocular tubercle less than its own diameter from the anterior border; lateral ocular clusters about equidistant from the median tubercle, from the anterior border, and from the lateral border at the emargination above the base of the first leg. *Chela* with trochanter and femur spined as in *P. parvulus*; spines of tibia differing from those of the three foregoing species in that the second and sixth are much shorter than the fourth, and less than half the length of the third and fifth respectively, the eighth spine is even more reduced than in *P. parvulus*; hand as in *P. parvulus*. *Genital operculum* rather large, its length exceeding that of the sternal area of the cephalothorax; sternal area of third abdominal somite straight from side to side.

Total length 14 mm., width of carapace 8·5; length of genital operculum 2·5.

Hab. North America, Texas and Lower California[4].—Mexico[4]; Central America as far south as Nicaragua[4] (*fide Kraepelin*).

The only example of this species available for description is the type, which is erroneously ticketed "Burdwan, India," and formed part of Col. Hardwicke's collection.

HEMIPHRYNUS.

Hemiphrynus, Pocock, Ann. & Mag. Nat. Hist. (7) ix. p. 161 (1902).

Very closely allied to *Phrynus*, but differing in that the tibia of the chela is armed above on its inner edge with nine spines, of which the third from the proximal end and the fourth from the distal end are the longest. These two long spines are apparently homologous to the two longest spines on this segment in *Phrynus*, which are respectively the third from the proximal end and the fourth or third from the distal end; but whereas in *Phrynus* there is only *one* long spine between these two, in *Hemiphrynus* there are *two*.

Type *H. lævifrons*, Poc.

Distribution. Central and South America; Bahamas.

In addition to the three species described below, this genus includes *Phrynus viridiceps*, Poc. [Journ. Linn. Soc., Zool. xxiv. p. 540 (1893), and Ann. & Mag. Nat. Hist. (6) xiv. p. 279 (1894)], from the Bahamas, and *P. macrops*, Poc. [Ann. & Mag. Nat. Hist. (6) xiv. p. 281, t. 7. fig. 3 (1894)], from S. America. Both appear to be valid species. The first will fall alongside *H. aztecus* under heading *a*, and the second alongside *H. raptator* under *a'* of the synoptical table that follows.

Synopsis of the Central-American Species.

a. Underside of tibia of chela evenly convex and coarsely granular right up to the base of the spines, without a trace of a longitudinal crest dividing the lower from the outer surface; spines on tibia short, the longest less than the width of the segment; first and third spines on lower side of hand minute &c. . . . . *aztecus*, Poc.

b. Underside of tibia of chela flat, horizontal, forming a right angle with the outer surface, from which it is separated by a strong longitudinal ridge; the lower side with at most a few coarse granules at least in its distal half; spines on tibia long, the longest considerably exceeding the width of the segment; first and third spines on lower side of hand longish.

a'. First spine on upperside of hand longer than the third, as in *H. aztecus*, and as in that species the trochanter is armed with only four spines, the one on the middle of the anterior surface being small, not longer than the superior spines . . . . . *raptator*, sp. n.

b'. First spine on upperside of hand always shorter than the third; anterior side of trochanter armed with five spines, one being on the middle of the surface . . . . . *lævifrons*, Poc.

1. **Hemiphrynus aztecus.** (Tab. XI. figg. 2, 2 *a*, *b*, ♂.)

Tarantula azteca, Pocock, Ann. & Mag. Nat. Hist. (6) xiv. p. 280, t. 7. fig. 2 (1894) [1].

Colour almost entirely blackish-brown, without distinct flavous spots or bands. *Carapace* finely and closely granular, and sparsely studded with coarser granulation; the anterior border very distinctly emarginate, and evenly and somewhat coarsely denticulate, concealing the subfrontal process; median ocular tubercle about its own length from the anterior border; lateral eye-clusters subequally distant from the median lateral, from the anterior border, and from the lateral emargination above the base of the first leg. *Mandibles* at most very weakly tuberculous at the distal end above. *Chelæ* robust, moderately long, the tibia rather longer than the median length of the carapace, the width of which is about as long as the tibia and the hand (protarsus); the trochanter armed with four spines, of which only the two inferior are long and strong, the other two being short and spinuliform; femur armed above with six spines and some spinules, the third the longest, but only about half the height of the segment, the fourth and sixth short; also armed below with six spines, of which the fourth and sixth are the shortest, the first a little longer than the second and third, but less than the height of the segment; this segment coarsely and closely granular above and below, finely granular in front, with only a few coarse granules intermixed; tibia somewhat coarsely granular above and below, the granules on the lower side passing right up to the base of the spines throughout the length of the segment, no trace of a longitudinal crest running along the outer side of the lower surface and separating it from the external surface; anterior surface finely granular, with a few coarser granules; nine spines on upper inner edge, the first, eighth, and ninth the smallest, second and seventh coming next in size and subequal, third the longest, fourth and sixth almost as long and subequal, fifth midway between the second and fourth; none of the spines long, the longest (third) a little less than the height of the inner surface of the tibia, and still less than the width from the upper inner to the under outer edge; hand almost smooth, a few granules below, its upper edge with three strong spines, the first or proximal longer than the third or distal, and about half the length of the median; the inferior surface armed with one long spine and two spinules. *Legs* with granular femora; femur of the first about one-third longer than the width of the carapace, which is a little less than that of the second, and equal to that of the fourth.

Measurements in mm.—Total length 23, median length of carapace 7·8, greatest width 12·8; height of femur of chela 3; length of tibia 9·5, thickness 3·5, length of longest spine 2·5.

Hab. Mexico, Tuxtla (*coll. Keyserling* [1]), Oaxaca [1].

Six specimens seen.

2. **Hemiphrynus raptator,** sp. n. (Tab. XI. figg. 3, 3 *a–g*, ♂.)

Colour of carapace and chelæ deep blackish-brown, the former often with four marginal reddish spots, and the same number of reddish stripes radiating from the central depression; abdomen blackish, with a large yellowish-red ring round the muscular impression, or when the yellowish patches increase in size describable rather as reddish-yellow with a median and a lateral dark band; femora of legs in the adult uniformly dark reddish-brown, at most indistinctly spotted. *Carapace* finely granular, and beset with scattered coarser granules as in *H. aztecus*; the anterior border much straighter than in that species, the frontal lobes being less produced, and the lateral eye-clusters in consequence nearer to the anterior border; the median tubercle about its own diameter from the anterior edge, which conceals the frontal process. *Mandible* furnished above at the distal end with a pair of setiferous tubercles. *Chelæ* shaped as in *H. aztecus*, but most of the spines relatively much longer, the longest spine on the upperside of the femur as long as the height of the segment, and the longest on the lower side much longer; tibia differing essentially from that of *H. aztecus* in that the underside is flat and horizontal, and separated from the upperside by a distinct ridge studded with coarse granules, and at least in the distal half of this segment there are no coarse granules lying close to the base of the spines; the longest spines—*i. e.*, the third and sixth—are much longer than the thickness of the segment, the fourth being equal to its thickness from the upper inner edge to the under outer edge; also the fifth spine is very noticeably shorter than the second, and not much longer than the seventh; hand (protarsus) as in *H. aztecus*, except that the long spines

are longer, exceeding the height of the segment. *Legs* longer than in *H. aztecus*, the femur of the fourth always considerably exceeding the width of the carapace; that of the first variable in length, generally from about twice to twice and a half the length of the width of the carapace.

Measurements in mm. of ♂ ad. (type from Teapa).—Total length 28; median length of carapace 9·8, its width 15; length of tibia of chela 13, thickness 3, length of its longest spine 3; height of femur 2·5, length of longest spine 3; length of femur of first leg 34, of fourth 22·5.

Hab. Mexico, Teapa in Tabasco (*H. H. Smith*), Yucatan (*coll. Keyserling*); Guatemala, Cahabon in Vera Paz, and the ruins of Tikal, Peten (*Sarg*).

I have seen twenty-seven specimens of this species from the above-mentioned localities, including young and adults of both sexes, varying in length from 7 to about 30 mm. This series is particularly instructive, since it proves that the characters are, on the whole, so constant that there is never any doubt even in the youngest specimens as to which of the three Central-American *Hemiphryni* they belong. In all the crest on the lower side of the tibia of the chela is present, the first spine on the upperside of the hand is longer than the third, and the fifth on the upperside of the tibia is shorter than the second, and the spines are noticeably longer than in *H. aztecus*. The chief difference in the young lies in the fact that the chelæ are shorter and much smoother than in the adult.

The adults vary considerably in size. Two ovigerous females from the ruins of Tikal, Peten, give the following measurements:—*a*, large specimen; *b*, small ditto. Total length 30 (*a*), 23 (*b*); width of carapace 15 (*a*), 11 (*b*), its median length 10·5 (*a*), 8 (*b*); length of tibia of chela 12·5 (*a*), 8 (*b*); femur of first leg 33 (*a*), 20 (*b*), of fourth 21 (*a*), 13 (*b*).

3. **Hemiphrynus lævifrons.** (Tab. XI. figg. 4, 4 *a*.)

Tarantula lævifrons, Pocock, Ann. & Mag. Nat. Hist. (6) xiv. p. 279, t. 7. figg. 1, 1 *a* (1894) [1].

Nearly allied to *H. raptator*, Poc. *Colour* the same as in that species. Anterior border of *carapace* less strongly denticulated; upperside of mandibles without a pair of tubercles at their distal end. *Chelæ* with practically the same spine-armature, except that there is a distinct spine, almost as long as the external of the three inferior spines, on the middle of the anterior surface of the trochanter, and of the three spines on the upperside of the hand, both the proximal and distal are long, but the latter is longer than the former, in the adult almost or quite twice as long. In the young the two are subequal and about one-third of the length of the median spine, but as age advances the proximal diminishes in relative length, while the distal at the same time increases, until ultimately the proximal is only about one-fourth the length of the median and scarcely more than half that of the distal, which itself exceeds half the median. In *H. raptator*, on the other hand, the distal spine is at all ages small, and never half the length of the proximal, which, in the adult, is about half the length of the median. Moreover, the granules on the chela are fewer in number and smaller than in *H. raptator*.

Measurements in mm.—Total length 24; width of carapace 14, median length 9; length of tibia of chela 10, thickness 3, length of its longest spine 4; length of femur of first 28, of fourth leg 17.

Hab. Guatemala (*Champion*); Costa Rica (*Rogers*); Panama, Bugaba, Chiriqui (*Champion*).—West Coast of America (? Colombia or Ecuador) [1].

The Godman and Salvin collection contains seven specimens of this species, the

largest being the one measured, and the smallest reaching a length of 14 mm., with the carapace 6·5 mm. in width, and the tibia of the chela 4 mm. long.

Apart from these examples, there are three in the British Museum, the type and two others, which are merely labelled "W. Coast of America." Hence the discovery of the exact distribution of this species is of much interest.

Kraepelin describes the following as the only species of this type represented in Mexico:—

Phrynus fuscimanus, C. L. Koch.

Syn. *Phrynus fuscimanus*, C. L. Koch, Die Arachn. xv. p. 67, fig. 1463 (1848).
Admetus fuscimanus, C. L. Koch, Uebersicht Archn. Syst. v. p. 81 (1850).
Phrynus mexicanus, Bilimek, Verh. zool.-bot. Ges. Wien, xvii. p. 231 (1867).
Neophrynus fuscimanus, Kraepelin, Abh. Ver. Hamb. xiii. p. 25 (1895).
Tarantula fuscimanus, Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 243 (1899).

It is impossible even to guess how many species are here confused in the above-given synonymy. The description, covering three pages quarto in length, furnishes no clue as to whether the specimens described presented the characters distinctive of *H. aztecus*, or *H. lævifrons*, or *H. raptator*, or of all three; and no detailed diagnosis is furnished of the structural features of the type of either *Phrynus fuscimanus* or *P. mexicanus*, although both were available for the purpose. Had this been done it would have been possible to hazard an opinion as to whether either or both of these names, or neither, is to be applied to one of the three species I have described in the foregoing pages.

The type of *Phrynus fuscimanus*, said to come from North America, was immature, to judge from the figure. The spines on the chelæ appear to be long. Hence the species may prove to be identical with either *H. raptator* or *H. lævifrons*, or to belong to an allied form. Bilimek's species, too, cannot be classified from the description. The specimens came from the Cave of Cacahuamilpa, in Mexico. The localities given by Kraepelin for the twenty-three specimens procured for his "Revision" are Yucatan, Cozumel Island, Guatemala, and Panama. Since *H. raptator* occurs in Yucatan, it is probable that specimens of that species furnished some of the material whereon the voluminous disquisition above referred to was based.

ACANTHOPHRYNUS.

Phrynopsis, Pocock, Ann. & Mag. Nat. Hist. (6) xiv. p. 257 (1894); Kraepelin, Abh. Ver. Hamburg, xiii. p. 21 (1895) (nom. præocc.).

Acanthophrynus, Kraepelin, Das Tierr., Scorpiones et Pedipalpi, p. 241 (1899).

Distinguishable from *Phrynus* and *Hemiphrynus* by the following characters:—The anterior border of the *carapace* is armed with long spiniform teeth, which extend on to the lateral margin of the cephalic portion, gradually diminishing in size from before backwards. The anterior surface of the femur of the

chela is armed basally with two spines, one superior and one inferior, in addition to those that stand upon the upper and lower edges; tibia of chela armed above with two long spines separated by a spinule, or a spine which does not exceed one-fourth the length of either of them; between the distal of these and the extremity of the segment stand three spines, the median of which is longer than the others; hand armed above and below with a single long spine, the upper nearer the base of the hand than the corresponding long spine in *Phrynus* and *Hemiphrynus*. Proximal tarsal segment of the *legs* entire, without transverse membranous line.

Type *A. spinifrons*, Poc.

Distribution. California and Mexico.

1. **Acanthophrynus spinifrons.** (Tab. XI. figg. 5, 5 *a–e*, ♂.)

Phrynopsis spinifrons, Pocock, Ann. & Mag. Nat. Hist. (6) xiv. p. 286 (1894) [1].

Colour a tolerably uniform reddish-brown, a distinct yellow ring round the apex of the femora of the legs. *Carapace* studded with coarse granulation, which is more scattered on the cephalic area; median ocular tubercle at least twice its long diameter from the groove that marks the thickening of the anterior margin; subfrontal process lying far beneath the edge of the carapace and bluntly rounded. *Chelæ* longish, trochanter armed in front with five spines on its lower and distal edge, there being two close together near the acutely angular pivot that articulates with the femur; femur armed above and below as in *Hemiphrynus raptator*, the longest inferior spine equal to the height of the segment, and the longest superior spine a little less; very coarsely granular above, much less coarsely below; tibia coarsely granular, with distinct inferior crest, the longest spine on its upper edge much exceeding the thickness of the segment; the spine between the two long spines minute and spinuliform, subequal to or smaller than the proximal and distal spines, much smaller than the third spine from the proximal and the third from the distal end; hand with only a few granules above and below externally; two spinules on the area lying on the proximal side of the upper long spine; tibia of chela as long as the width of the carapace. Femur of first *leg* more than twice as long as width of carapace, of fourth leg one-fourth longer.

Measurements in mm.—Total length 33; width of carapace 16, median length (not including anterior spines) 11·5; length of tibia of chela 16, thickness 3, length of its longest spine 4·5; femur of first leg 37, of fourth 20.

Hab. Mexico, Ciudad in Durango [1] (*Forrer*).

Subfam. *HETEROPHRYNINÆ*.

Characters as above (p. 49).

HETEROPHRYNUS.

Phrynus, C. Koch (nec Lamarck), Uebersicht Arachn. Syst. v. p. 80 (1850) (part.).

Admetus, C. Koch, loc. cit. p. 81 (1850) (part.).

Tarantula, Karsch (nec Fabr.), Arch. f. Naturg. xlv. 1, p. 107 (1879) (type *pumilio*, Koch); Simon, Ann. Soc. Ent. Fr. lxi. p. 51 (1892) (type *reniformis*, Pall., nec Linn.).

Heterophrynus, Pocock, Journ. Linn. Soc., Zool. xxiv. p. 527 (in note) (1894); Ann. & Mag. Nat. Hist. (6) xiv. p. 275 (1894) (type *chiracanthus*, Gerv.); Kraepelin, Abh. Ver. Hamb. xiii. p. 36 (1895).

Admetus, Kraepelin (nec Koch, Simon), Das Tierr., Scorpiones et Pedipalpi, p. 245 (1899).

Same characters as for the subfamily.

1. **Heterophrynus chiracanthus.** (Tab. XII. figg. 1, 1 *a*.)

Phrynus chiracanthus, Gervais, Journ. Inst. Soc. Phil. Paris, x. p. 72 (1842)[1]; Ins. Apt. iii. p. 3 (1844)[2]; Butler, Ann. & Mag. Nat. Hist. (4) xii. p. 117 (1873)[3].

Heterophrynus chiracanthus, Pocock, Ann. & Mag. Nat. Hist. (6) xiv. p. 287 (1894)[4].

Colour a tolerably uniform blackish-brown; legs redder. *Carapace* sparsely covered with coarse granules; the anterior border transverse, denticulated; the median ocular tubercle high, about its own diameter from the margin; the lateral eye-clusters not widely separated, only a little further from each other than either is from the lateral margin, and about equidistant from the anterior border and from the median tubercle. *Chelæ* very long and slender, coarsely granular, the tibia twice and a half times the width of the carapace; the trochanter armed with four long spines; femur with six spines above and five below, the distal in each case small, third on upper and first on lower the longest, and considerably exceeding the height of the segment; tibia armed with seven upper and six lower spines, the proximal small, spinuliform, the two distal small and subequal; hand granular above and below, smooth externally.

Measurements in mm.—Total length 30; median length of carapace 11, width 16·5; femur of chela 39; tibia 42; femur of first 61, of fourth leg 36.

Hab. Central America (*fide Kraepelin*).

The description given above and the figures 1, 1 *a* on Tab. XII. have been taken from the type specimen of the species which is in the British Museum.

Dr. Kraepelin describes all the species of this genus, some five or six in number, under the name *Admetus pumilio*, C. L. Koch, and amongst the localities cites Colombia, Venezuela, Guiana, and the Amazons. The type of *A. pumilio*, Koch, is a very young specimen, which, from the figure and description, cannot be assigned with certainty to any one of the species of the genus I recognize. Kraepelin does not describe the characters of the Central-American specimen he mentions. Hence it is impossible to do more than guess to which of the species it belongs. But since some of the Demerara scorpions, e. g., *Tityus androcottoides*, *T. cambridgei*, subsp. *championi*, and *Broteochactas delicatus*, extend into Panama, I have assumed provisionally that the *Heterophrynus* may also prove to be identical with the Demerara species described by Gervais as *Phrynus chiracanthus*.

Order SOLIFUGÆ.

Fam. SOLPUGIDÆ.

Stigmata on the second and third abdominal sterna opening on the posterior border of the plates, and not covered by finely toothed plates (*serrulæ*). Claws on second, third, and fourth legs with basal stalk naked. Tarsus of palp immovably fused to tibia.

The recorded Central-American genera are referable to the two following subfamilies:—

a. Mandible with feebly developed stridulating-ridges on the inner side; anterior border of carapace straight from side to side. Mandible of male without flagellum, and upper jaw untoothed . . . . . EREMOBATINÆ.

b. Mandible with strongly developed stridulating-ridges on the inner side; the upper jaw in the male toothed and furnished with a flagellum . . . . . DÆSIINÆ.

Subfam. *EREMOBATINÆ*.

Dataminæ, Kraepelin, Jahrb. Hamb. Wiss. Anst. xvi. p. 240 (1899).
Eremobatinæ, Kraepelin, Das Tierr., Palpigradi et Solifugæ, p. 116 (1901).

This subfamily contains the single genus *Eremobates*.

EREMOBATES.

Gluvia, C. Koch, Arch. f. Naturg. viii. 1, p. 355 (1842); Uebersicht Arachn. Syst. v. p. 97 (1850) (ad max part.); Pocock, Ann. & Mag. Nat. Hist. (6) xvi. p. 94 (1895).

Datames, Simon, Ann. Soc. Ent. Fr. (5) ix. p. 133 (1879); Kraepelin, Jahrb. Hamb. Wiss. Anst. xvi. p. 240 (1899) (nom. præocc.).

Eremobates, Banks, Amer. Nat. xxxiv. p. 426 (1900); Kraepelin, Das Tierr., Palpigradi et Solifugæ, p. 117 (1901).

Leg of first pair without claw. Tarsus of legs furnished beneath with distinct pairs of spines; tibia of second and third legs furnished above with five strong spines arranged in a single series, and three or four pairs of weaker spines below. Mandibles with only feebly developed striduating-ridges on the anterior portion of the smooth area on the inner side of their appendages; without any flagellum, and with the upper jaw untoothed in the male.

Type *Gluvia cinerascens*, C. L. Koch.

Distribution. Southern States of North America and Mexico.

Synopsis of the Central-American Species.

a. Upper (immovable) jaw of mandible toothless, nearly straight, and projecting almost at right angles from the basal area bearing the cheek-teeth. (Males.)

*a*¹. Lower (movable) jaw of mandible armed with two large teeth and one or two small teeth between them.

*a*². Patella of palp armed below with two rows of short spines; its

tibia beset below with numerous papilliform bristles; distal tooth of lower jaw of mandible remote from the proximal . . *cinerascens*, C. Koch.

b^2. Patella of palp unspined below, its tibia without papilliform bristles; distal tooth of lower jaw much closer to the proximal. *toltecus*, Poc.

b^1. Lower jaw of mandible with one large proximal tooth and one or two small teeth in front of it.

a^3. Distal end of femur and proximal end of patella of palp armed below with strong spines; movable jaw of mandible with two or three small teeth in front of the large tooth, and one on its inner side . . . . . *formidabilis*, Simon.

b^3. Distal end of femur and proximal end of patella of palp unspined; lower jaw of mandible with one small tooth in front of the large tooth, and none on the inner side.

a^4. Mandible yellow with three dark stripes; upper jaw lightly sinuous, abruptly narrowed towards the point; upper long cheek-tooth close to base of jaw, the intervening area less than the diameter of the tooth . . . . . *elongatus*, C. L. Koch.

b^4. Mandible without dark stripes; upper jaw almost straight, gradually tapering; upper long cheek-tooth separated from base of movable jaw by a space which is nearly equal to the basal diameter of the latter . . . . . *aztecus*, sp. n.

b. Upper jaw of mandible strongly toothed, its toothed area forming a continuous curve with that of the cheek-teeth. (Females.)

a^5. Patella of palp spined below; minor teeth on the upper jaw isolated, not rising close to the base of the larger teeth . . . . . *cinerascens*, C. Koch.

b^5. Patella of palp unspined; minor teeth on upper jaw lying close to the base of the major teeth.

a^6. Tibia of palp furnished in its distal half beneath with about thirty lenticular papillæ . . . . . *lentiginosus*, Kraep.

b^6. Tibia of palp without papillæ beneath.

a^7. Tarsus of fourth leg furnished laterally with long, thick, white hairs; movable jaw with three minor teeth . . . . . *formidabilis*.

b^7. Tarsus of fourth leg normally hairy; movable jaw only with two minor teeth.

a^8. Mandible ornamented above with three brown stripes . . *formicarius*, C. L. Koch.

b^8. Mandible without trace of brown stripes above . . . . *aztecus*, sp. n.

1. **Eremobates aztecus**, sp. n. (Tab. XII. figg. 2, 2 *a*, ♀; 3, 3 *a*, ♂.)

♀. *Colour*: carapace, with exception of the black ocular tubercle and a narrow marginal transverse line on each side of the latter, mandibles, palpi, and legs a uniform clear ochre-yellow, the tip of the tarsus of the palp only being brownish; terga of abdomen and thorax blackish, sides of these regions deep ashy-grey, sternal plates yellowish. Width of *head-plate* exceeding length of patella of palp, about equal to its tibia and tarsus, and to patella or tibia and tarsus of fourth leg; tubercle furnished in front with numerous subequal bristles. *Mandible* furnished above with simple long bristles; upper jaw armed distally with two large subequal teeth and a smaller tooth between them, proximally with one very large tooth, which bears two much smaller teeth on its anterior slope at the base, and behind it one minute tooth

just above the upper cheek-tooth of the outer row, upper cheek-tooth of inner row long; lower jaw armed with two large teeth, the distal a little smaller than the proximal, and two smaller intermediate teeth, the upper of which is situated on the anterior slope of the proximal principal tooth and the lower at its base. *Palpi* covered with longer and shorter bristles, entirely without spines, except for one long apically setiform spine on the inner side of the distal end of the femur; lower side of the tibia beset with many vertical and truncate so-called cylindrical bristles. Patella of *legs* armed beneath apically with a pair of long spines, which on that of the fourth leg are apically setiform, and one anterior setiform spine, thicker on the fourth than on the third, and very slender on the second, in the distal third of the segment; the tibia armed beneath with three anterior and four posterior slender spines (in addition to the five strong spines on the upperside of these segments on the second and third legs); tarsus of fourth with four pairs of spines, the sides and the lower surface of the segment normally bristly.

♂. Resembling the female in colour, but with the palpi and legs stained with brown. *Carapace* about two-thirds the length of the patella, or the tibia and tarsus of the palp and of the patella of the fourth leg, and as long as the tibia of the fourth. *Mandible* with upper fang nearly straight, gradually tapering to a point, projecting nearly at right angles from the plane of the cheek-teeth; the long upper cheek-tooth of the outer series separated from the base of the fang by a wide space, which is about equal to the diameter of the base of the fang, a minute tooth above the long cheek-tooth and three below it, the middle of which is the larger; the inner row of four teeth, the upper the largest, the third larger than the second, the fourth or lowest the smallest, and situated on the tooth above it; lower jaw armed with one large tooth, which is furnished anteriorly at the base with one minute tooth. Spine-armature of *legs* as in female.

Measurements in mm.— ♀. Total length of trunk 27; width of head-plate 7; length of palpus 19, its patella 6; tibia and tarsus 7; fourth leg 22, its patella 7. ♂. Total length 19; width of carapace 4·5; length of palpus 19, its patella 7; tibia and tarsus 7·3; fourth leg 22, its patella 7.

Hab. Mexico, Guanajuato, Atoyac in Vera Cruz (*A. Dugès*).

2. **Eremobates toltecus.** (Tab. XII. fig. 4, ♂.)

Gluvia tolteca, Pocock, Ann. & Mag. Nat. Hist. (6) xvi. p. 95 (1895) [1].

Eremobates toltecus, Kraepelin, Das Tierr., Palpigradi et Solifugæ, p. 125 (1901) [2].

♂. *Colour* practically the same as in *E. aztecus*. Width of *head-plate* as compared with the length of the segments of the palpi and the fourth legs greater than in that species, more than three-quarters the length of the patella, and about three-fourths that of the tibia and tarsus, about three-fourths the length of the patella of the fourth leg, and as long as the tibia. Upper jaw of *mandible* not so straight and gradually tapering as in *E. aztecus*, very lightly sinuous, its upper edge somewhat abruptly bent downwards towards the apex; distance between the upper long tooth of the outer row of cheek-teeth almost as wide as the base of the upper fang, two minute teeth above it, this tooth not so large as in *E. aztecus*, cheek-teeth of the inner row practically as in that species; lower jaw very differently armed from that of *E. aztecus*, furnished with two large teeth, the proximal larger than the distal; two small teeth between them, both set upon the anterior slope of proximal tooth, the upper of the two very much larger than the lower, which is minute. *Palpi* and legs as in *E. aztecus*, but shorter (*cf.* measurements).

Measurements in mm.—Total length 16; width of head 4·3; length of palpus 17, its patella 6; tibia and tarsus 6·5; fourth leg 19, its patella 6.

Hab. Mexico [1] [2].

3. **Eremobates cinerascens.** (Tab. XII. fig. 5, ♂.)

Gluvia cinerascens, C. Koch, Arch. f. Naturg. viii. 1, p. 355 (1842) [1]; Die Arachn. xv. p. 96, fig. 1484 (1848) [2].

Eremobates cinerascens, Kraepelin, Das Tierr., Palpigradi et Solifugæ, p. 122 (1901) [3].

Datames pallipes (Say), Simon, Ann. Soc. Ent. Fr. (5) ix. p. 140 (1879) (♀, nec ♂) [4] (nec *D. pallipes*, Say).

♂. *Colour* much the same as in the two preceding species. Upper jaw of *mandible* long, slender, straight,

separated by a deep and wide notch from the row of cheek-teeth, which project far forward beyond its base, those of the outer row consisting of three longish teeth, the upper the longest, one minute tooth at the bottom, and one or two minute teeth between the large upper tooth and the base of the fang; lower jaw with two large teeth, the distal the smaller of the two, and lying about midway between the proximal and the tip of the fang; the proximal tooth large, conical, with one or two small teeth at its base. *Palpi* with tibia beset above and below with numerous cylindrical bristles, and also bearing beneath in its distal two-thirds about sixty lenticular papillæ; the patella armed below with two often irregularly arranged rows of short spines interspersed amongst the cylindrical bristles, and about as long as the diameter of the segment; some weak spines also on the upperside of the femur. Fourth *leg* with its tibia armed below with four or five pairs of spiniform bristles, its inner border without a long row of nine spiniform setæ beneath.

♀. Like the male in most characters. The upper jaw of the *mandible* normally toothed and arched; its intermediate smaller teeth almost isolated; lower jaw likewise with two intermediate teeth, of which one is very small. Tibia of *palp* with only a few lenticular papillæ between the cylindrical bristles, patella spined as in the male. Fourth *leg* with its tibia spined as in that sex.

Length up to 15–16 mm.

Hab. North America, Colorado, Utah, Nevada, Kansas [4].—Mexico [1 2 3].

4. **Eremobates lentiginosus.**

Datames lentiginosus, Kraepelin, Jahrb. Hamb. Wiss. Anst. xvi. p. 244 (1899) [1].

Eremobates lentiginosus, Kraepelin, Das Tierr., Palpigradi et Solifugæ, p. 124 (1901) [2].

♀. Apparently resembling the preceding species in *colour*. As in *E. cinerascens*, the tibia of the *palp* furnished beneath with lenticular papillæ, these papillæ about thirty in number and confined to the distal half of the segment, which is beset with scattered cylindrical bristles; no spines on the palpi. Dentition of the mandible apparently as in *E. cinerascens*, but the two minor teeth in the upper jaw not so isolated.

Length up to 20 mm.

Hab. Mexico [1 2].

5. **Eremobates elongatus.** (Tab. XII. fig. 6.)

Gluvia elongata, C. L. Koch, Arch. f. Naturg. viii. 1, p. 355 (1842) [1].

Eremobates elongatus, Kraepelin, Das Tierr., Palpigradi et Solifugæ, p. 126 (1901) [2].

Colour: mandible yellow, with three brown spots; carapace brownish-red; abdominal tergal plates infuscate; palpus from the distal end of the femur to the extremity lightly infuscate; legs tinted like the palpus. Upper jaw of *mandible* lightly sinuous, somewhat abruptly narrowed at the extremity, the groove on its inner side extending almost to the base; the upper cheek-tooth lying close to the base of the fang, the intervening space exceedingly narrow, much less than the diameter of the tooth or of the jaw; lower jaw armed with one very large tooth preceded by a small denticle situated in the angle formed where the tooth arises from the jaw.

Length of body 11·5 mm.

Hab. Mexico [1 2].

The above-given description is abridged from Kraepelin's monograph, the species being unknown to me.

6. **Eremobates formicarius.**

Gluvia formicaria, C. L. Koch, Arch. f. Naturg. viii. 1, p. 353 (1842) [1]; Die Arachn. xv. p. 99, fig. 1487 (1848) [2].

Eremobates formicarius, Kraepelin, Das Tierr., Palpigradi et Solifugæ, p. 126 (1901) [3].

? *Datames geniculatus*, Simon, Ann. Soc. Ent. Fr. (5) ix. p. 138, t. 3. fig. 31 [4] (nec *Gluvia geniculata*, Koch).

♀. *Colour*: mandibles yellow or yellowish-red, with brown stripes; carapace dark yellowish-red; abdomen with infuscate tergal and yellow sternal plates; palpi yellowish-red, darker distally; legs yellowish-red. *Mandible* with upper jaw normally formed and normally toothed, the minor teeth lying close to the base of the major teeth. Tibia of *palp* without papillæ and without spines, studded ventrally with strong cylindrical bristles; patella unspined, bearing above and below short and long bristles, and above also some fork-shaped hairs; femur bristly below. Protarsus of fourth *leg* with four or five pairs of spines, on the inner side beneath no conspicuous long row of strong spiniform bristles.

Length of body 9 mm. in type (young), up to 16 mm. in *E. geniculatus* (Simon).

Hab. North America, Texas [4].—Mexico [4].

7. Eremobates formidabilis. (Tab. XII. fig. 7, ♂.)

Datames formidabilis, Simon, Ann. Soc. Ent. Fr. (5) ix. p. 136, t. 3. figg. 25, 26 [1].

Eremobates formidabilis, Kraepelin, Das Tierr., Palpigradi et Solifugæ, p. 127, fig. 95 (1901) [2].

Datames striatus, Putnam, Proc. Davenport Acad. Sci. iii. p. 255 (1883) [3].

Colour of carapace and mandibles yellowish-red, the former lightly infuscate; tergal plates of abdomen dark, sternal plates yellow, lateral membrane violet-grey dorsally; palpi uniformly yellowish-red in female, the protarsus dark reddish-brown in male; legs uniformly coloured, except the fourth pair in the male, which are darker in the middle of their length.

♂. Upper jaw of *mandible* straight, slightly expanded in the middle, its inner side grooved throughout its length, in the basal third of its lower edge forked, hollowed out into a longitudinally elliptical area into which the enlarged tooth of the lower jaw fits, the cheek armed with two larger and two or three smaller teeth on each side; lower jaw with one large proximal tooth and two smaller distal teeth, the proximal of these two rising from the base of the larger tooth in front, on the inner side of the large tooth arises a tooth-like tubercle. Tibia of the *palp* without papillæ and true spines, but studded externally with numerous cylindrical bristles, covered dorsally only with fine bristles; patella armed below in the basal half with about six spines arranged irregularly in two rows, and beset, in addition, with cylindrical and other bristles; bearing short and long bristles above; femur with some spines at the distal end of the lower surface. Protarsus of fourth *leg* with four or five pairs of spiniform setæ beneath, and on the inner border with some additional spiniform setæ.

♀. Upper fang of *mandible* normally toothed and normally shaped, with two or three small teeth rising from the base of the principal teeth. *Palpi* as in the male, but the femur and patella armed beneath with spiniform setæ instead of with spines. Protarsus of the *legs* of fourth pair armed beneath with four or five pairs of spines, without conspicuous longitudinal row of nine equally strong spiniform setæ on the inner edge below.

Length, ♂ ♀, 27 mm.

Hab. North America, California and Arizona [3].—Mexico [1], Guanajuato (*Mus. Brussels & Mus. Simon* [1]).

Of the following species no description has been published :—

Eremobates caspari.

Datames caspari, Marx, Proc. Ent. Soc. Wash. ii. no. 2, p. 254 (1891) [1].

Hab. Mexico, Villaldama [1], Nuevo Leon.

Only the habits of this species were recorded by Marx, although it was marked with the symbol "*n. sp.*"

Subfam. *DÆSIINÆ.*

Dæsiinæ, Kraepelin, Jahrb. Hamb. Wiss. Anst. xvi. pp. 208, 221 ; Das Tierr., Palpigradi et Solifugæ, p. 83 (1901).

Recognizable from the Eremobatinæ by the presence of well-developed stridulating-ridges on the inner surface of the mandibles, by the presence of the flagellum and of teeth on the upper jaw of these appendages in the male, by the convex procurvature of the anterior border of the carapace, and by the presence of only three spines on the upperside of the tibia of the third leg.

The three genera known from Central America may be diagnosed as follows:—

a. Tarsus of second and third legs one-jointed ; of fourth three- or one-jointed.
  a'. Tarsus of fourth leg one-jointed . . . . . *Hemiblossia.*
  b'. Tarsus of fourth leg three-jointed . . . . . *Ammotrecha.*
b. Tarsus of second and third legs two-jointed ; of fourth four-jointed . . . . *Dæsia.*

AMMOTRECHA.

Gluvia, C. L. Koch, Arch. f. Naturg. viii. 1, p. 355 (1842) [1] ; Uebersicht Arachn. Syst. v. p. 97 (1850) (part.) [2].

Cleobis, Simon, Ann. Soc. Ent. Fr. (5) ix. p. 145 (1879) (part.) [3] ; Pocock, Ann. & Mag. Nat. Hist. (6) xvi. p. 96 (1895) [4] ; Kraepelin, Jahrb. Hamb. Wiss. Anst. xvi. p. 238 (1899) [5].

Ammotrecha, Banks, Amer. Nat. xxxiv. p. 426 (1900) [6] ; Kraepelin, Das Tierr., Palpigradi et Solifugæ, p. 109 (1901) [7].

Tarsi of second and third pairs of *legs* one-jointed, of fourth leg distinctly three-jointed, the second segment short and annuliform, the entire tarsus of this leg slender, elongate, five or six times as long as high ; femur of fourth leg expanded ; tibia of second and third pairs of legs without distinct row of spines on the upperside. Upper jaw of *mandible* toothed in both sexes, armed with two large distal teeth, preceded by a third large tooth, in front and behind which there is a small tooth ; upper edge of the jaw crested. *Flagellum* membranous, elongate, articulated to the inner border of the upper jaw in the male.

Type *A. limbata*, Luc. (sub *Galeodes*).

Distribution. Southern States of North America, Central America, Antilles, and northern parts of South America.

Key to the Species.

a. Patella of palp armed beneath with a row of seven or eight short spines . *peninsulana*, Banks.
b. Patella of palp unarmed beneath.
  a[1]. Upperside of abdomen with scarcely a trace of median dorsal pale band ; flagellum of male with its upper and lower edge curled over and almost in contact ; sixth tooth of upper jaw in male much smaller than fourth . . . . . *limbata*, Lucas.
  b[1]. Upperside of abdomen with broad median yellow band ; upper and lower edges of flagellum widely separated ; sixth tooth of upper jaw in male as large as the fourth.
    a[2]. Mandibles and head-plate yellow, a distinct clear yellow ring round the distal end of the patella of the fourth leg . . . . . *stolli*, Poc.
    b[2]. Mandibles and head-plate uniformly chocolate-brown ; no pale band round the distal end of the patella of the fourth leg . . . . . *picta*, sp. n.

1. **Ammotrecha stolli.** (Tab. XII. figg. 8, 8 *a*, *b*.)

Cleobis stolli, Pocock, Ann. & Mag. Nat. Hist. (6) xvi. p. 97 (1895) [1].

Ammotrecha stolli, Kraepelin, Das Tierr., Palpigradi et Solifugæ, p. 115 (1901) [2].

♀. *Colour*: head-plate pale yellow, ocular tubercle black with a median pale stripe; mandibles yellow, with the fangs ferruginous; upperside of abdomen with a median yellow stripe, the sides of the tergal plates fuscous, the fuscous area on each side about as wide as the median stripe or rather narrower, on the posterior terga the median stripe gradually dies away; lateral integument of abdomen ashy or violet-grey above adjacent to the terga, the sides of the thoracic terga also infuscate; palpi mostly yellow, with distal end of femur and tibia lightly infuscate, the distal half of the tibia and the tarsus more deeply infuscate; first leg pale, second only lightly infuscate, third more strongly infuscate on femur, patella, and tibia, with an indistinct pale ring round the end of the patella; fourth leg with the femur, patella, and tibia strongly infuscate, with a distinct and broad yellow ring round the tip of the patella. Width of *head* equal to length of patella of palp, slightly shorter than its tibia and tarsus and the patella of fourth leg. *Mandible* with upper fang armed distally with three large subequal teeth and a small one between the second and third set almost upon the base of the anterior side of the latter; lower fang with two larger subequal teeth and a small tooth between them nearer the base of the inner. *Palpi* without spines on femur and patella; tibia with five pairs of strong short spines beneath, and furnished with numerous cylindrical bristles. Third and fourth pairs of *legs* with three anterior and one posterior distal spine beneath; tarsus with four pairs of spines beneath.

♂. Like the female in colour, but smaller, and with longer appendages. Width of *head* much less than length of patella or tibia and tarsus of palp or than patella of fourth leg. Upperside of the tibia and the lower side of the patella of the *palp* with cylindrical bristles. *Flagellum* elliptically elongate, its upper and lower edges widely separated.

Measurements in mm.— ♀. Total length of body 18; width of head 4·3; length of palp 15, its patella 5; tibia and tarsus 5·3; of fourth leg 16, its patella 5. ♂. Total length 12; width of head 2·5; length of palp 15, of fourth leg 15.

Hab. Guatemala (*Sarg*), Retalhuleu (*Stoll* [1]); Nicaragua [2]; Costa Rica [2].

2. **Ammotrecha picta,** sp. n. (Tab. XII. figg. 9, 9 *a*.)

♀. Differing from *A. stolli* principally in colour; head-plate deep chocolate-brown, ocular tubercle black, without median pale band; mandibles infuscate above, with three deeper-coloured dark stripes; abdomen coloured like that of *A. stolli*, but the lateral integument adjacent to the tergal plates paler, hence the dark area of the plates stands out more boldly as a pair of isolated bands; palpi entirely infuscate, except the basal half of the femur; first leg lightly infuscate, second, third, and fourth legs deeply infuscate, with no distinct pale ring round the distal end of the tibia of the fourth leg. *Mandibles* with dentition as in *A. stolli*. Length and spine-armature of *legs* as in that species.

♂. Resembling the female in colour, and like the male of *A. stolli*, but the cylindrical and other bristles on the palpi less numerous.

Measurements in mm.— ♀. Total length 18; width of head 4; length of palp 12, of fourth leg 14. ♂. Total length 15; width of head 3; length of palp and of fourth leg 16.

Hab. Guatemala (*Sarg*).

3. **Ammotrecha peninsulana.**

Ammotrecha peninsulana, Banks, Proc. Calif. Acad. Sci. (3) i. p. 290 (1898) [1]; Kraepelin, Das Tierr., Palpigradi et Solifugæ, p. 112 (1901) [2].

♀. *Colour*: head-plate and mandibles yellowish-red, lightly infuscate; abdomen with a narrow, brown, median, dorsal stripe, lighter brown elsewhere; palpi with femur yellowish-brown; patella brownish-red in the middle, with yellower distal and proximal ends; tibia yellowish-brown at the base, becoming darker

reddish-brown distally; first leg yellow, not infuscate, the rest yellowish-red; ocular tubercle with only two principal bristles, without subordinate bristles. *Mandible* with upper fang normally toothed, its upperside with a deep, obtusely angular notch at its base. *Palp* with patella armed below with a row of eight spines; tibia also armed below with a row (? two rows) of seven or eight short spines, both these segments beset above and below with cylindrical hairs, the femur bearing cylindrical and other hairs below and short forwardly directed bristles above. Fourth *leg* with cylindrical hairs on the upperside of the patella and tibia.

Length of trunk 12 mm.

Hab. Lower California, San José del Cabo [1].—Mexico, Hermosillo in Sonora [1].

This species is unknown to me. The description is adapted from Kraepelin's monograph.

4. Ammotrecha limbata.

Galeodes limbatus, Lucas, Mag. Zool. iv. Cl. viii. t. 5 (1835) [1].
Solpuga limbata, Gervais, Ins. Apt. iii. p. 90 (1844) [2].
Cleobis limbata, Simon, Ann. Soc. Ent. Fr. (5) ix. p. 148 (1879) [3].
Ammotrecha limbata, Kraepelin, Das Tierr., Palpigradi et Solifugæ, p. 112 (1901) [4].
? *Cleobis saltatrix,* Simon, Ann. Soc. Ent. Fr. (5) ix. p. 146, t. 3. figg. 32–36 (1879) [5].
Ammotrecha saltatrix, Kraepelin, Das Tierr., Palpigradi et Solifugæ, p. 113 (1901) [6].

♂. *Colour*: head-shield yellowish-brown, mandibles yellow; upperside of abdomen with a wide black median band embracing the entire terga, the median line sometimes less thickly pigmented than the sides; lateral and ventral surfaces of the abdomen yellow; palpi brown almost throughout, the tarsi and the base of the femur somewhat paler; legs tinted like the femur; ocular tubercle black, without pale median stripe. *Ocular tubercle* furnished in front with numerous short bristles. *Mandibles* normally toothed. *Flagellum* flask-shaped, distally pointed, its edges bent over so as almost to meet, separated only by a narrow slit. *Palp* with its tibia armed below with four spines (? pairs of spines), and furnished with cylindrical bristles.

♀. Like the male, but with the tibia of the palp without cylindrical hairs, and furnished with five (? pairs of) spines below.

Length of trunk up to 17 mm.

Hab. Mexico [1–6]; Guatemala [3].

This species, which is unknown to me, seems to differ from *A. picta* in the indistinctness of the median dorsal abdominal pale band in both sexes, in the form of the flagellum in the male, and in the small size of the sixth tooth of the upper jaw, which is much smaller than the fourth, whereas in *A. picta* the two are subequal. The above-given description is abridged from Kraepelin's monograph.

A. saltatrix was regarded by Simon as a valid species on the strength of the alleged smaller size of the flagellum in the male, and of the equality in size of the three distal teeth of the upper mandibular finger. According to Kraepelin, however, these characters are not sufficiently marked in the type-specimen to justify the view that *A. saltatrix* is a valid species. Hence I have regarded the name as a synonym of *A. limbata.* The only known examples of *A. saltatrix* were from Mexico.

HEMIBLOSSIA.

Hemiblossia, Kraepelin, Jahrb. Hamb. Wiss. Anst. xvi. p. 233 (1899) [1]; Das Tierr., Palpigradi et Solifugæ, p. 103 (1901) [2].

Closely allied to *Ammotrecha*, but with the tarsus of the fourth leg short, straight, dorsally arched and unsegmented. All the legs are shorter and relatively thicker, especially the femur of the fourth. The ocular tubercle is furnished with two rows of subsymmetrically arranged bristles, of which the anterior two are considerably the longest.

Type *H. bouvieri*, Kraep.

Up to the present time only two species of this genus have been described, namely, *H. bouvieri*, Kraep., and *H. o'neili*, Purcell, both of which occur in S. Africa. Neither of these is known to me in nature; but I am unable to find in their diagnosis mention of any differential character which justifies, in my opinion, the establishment of a new genus for the Central-American species described below, strange as may seem the generic identity between the Neotropical and Ethiopian forms. Slight differences perhaps exist in the numbers of hairs upon the ocular tubercle and the nature of the hairy clothing upon the palpi; but without a careful comparison between the types of the known species it would be premature to attach a generic significance to these features.

1. **Hemiblossia vittata**, sp. n. (Tab. XII. figg. 10, 10 *a–d*, ♀.)

Colour: head, mandibles, legs, palpi, and abdomen deep blackish-brown, the abdomen with a clear white median dorsal stripe, which extends of even width from the last segment over those of the thorax up to the head; lateral integument of abdomen deep greyish-black almost down to the sternal plates, which are themselves infuscate, the posterior wholly so, the anterior with a patch at the sides and on the posterior angle; genital operculum pale; malleoli with black margin. *Head-plate* thickly beset with short, pale, blunt-tipped hairs; ocular tubercle with two rows of subsymmetrically disposed shorter hairs behind the longer stouter anterior pair. *Palpi* short; the width of the head equal to the length of the patella and half the tibia; thickly clothed with short, simply attenuate hairs, and furnished in addition with long sensory setæ; without cylindrical bristles. *Mandibles* toothed as in *Ammotrecha stolli*. *Legs* spined approximately as in the genus *Ammotrecha*, but the spines relatively stouter; all the legs short; the width of the head-plate equal to the patella and half the tibia of the fourth.

Measurements in mm.—Total length 13; width of head 2; length of palpus 4, of fourth leg 6.

Hab. Guatemala (*Sarg*).

Although in the general darkness of its coloration this species approaches the two South-African forms, it may be at once distinguished from them by the presence of the conspicuous median dorsal white band.

The following species cannot be placed in any taxonomic arrangement, the description and figure being inadequate:—

Cleobis hirsutus, Banks, Proc. Calif. Acad. Sci. (3) i. p. 291, t. 17. fig. 31 (1898) [1].—*Hab.* Mexico [1].

DÆSIA.

Gluvia, C. L. Koch, Arch. f. Naturg. viii. 1, p. 355 (1842); Uebersicht Arachn. Syst. v. p. 97 (1850) (part.).

Dæsia, Karsch, Arch. f. Naturg. xlvi. 1, p. 234 (1880); Kraepelin, Jahrb. Hamb. Wiss. Anst. xvi. p. 227 (1899); Das Tierr., Palpigradi et Solifugæ, p. 88 (1901).

Biton, Karsch, Arch. f. Naturg. xlvi. 1, p. 234 (1880).

Tarsi of second and third pairs of legs two-jointed, of fourth pair four-jointed; tibia of second leg with five, of third leg with three spines. Upper jaw of mandible in female normally toothed, with one small intermediate, one larger proximal, and two large distal teeth; in the male the upper jaw is untoothed or weakly toothed. Flagellum membranous, fastened by a pivot to the inner surface of the upper jaw, oval, posteriorly pointed, its edges incurved.

Type *D. præcox*, C. L. Koch.

Distribution. Southern shores of the Mediterranean; Africa; Mexico.

1. Dæsia præcox. (Tab. XII. fig. 11.)

Gluvia præcox, C. L. Koch, Arch. f. Naturg. viii. 1, p. 355 (1842) [1]; Die Arachn. xv. p. 95, fig. 1483 (1848) [2].

Datames præcox, Simon, Ann. Soc. Ent. Fr. (5) ix. p. 144 (1879) [3].

Dæsia præcox, Karsch, Arch. f. Naturg. xlvi. 1, p. 234 (1880) [4]; Kraepelin, Das Tierr., Palpigradi et Solifugæ, p. 98 (1901) [5].

♂. *Colour*: mandibles and carapace yellow, the latter tinted with brown; abdomen black above, dark beneath with yellow borders, thickly clothed with white hairs; palp reddish-brown; legs of first, second, and third pairs yellowish, of fourth pair with femur and patella darker. *Mandible* with upper jaw slender, long, pointed, lightly arched, toothless; basal portion of the jaw furnished internally with four cheek-teeth, an upper long, sharp, and forwardly directed, and three subequal smaller teeth below; lower jaw terminating in a long, slender, and curved fang, and armed in the basal two-thirds of its length with two large teeth—an anterior directed forwards, and bearing near the base of its upperside a smaller angular tooth, and a posterior erect but curved backwards at the tip, and bearing near the base of its anterior edge a small tooth. *Flagellum* long, elliptical in its basal portion, with subparallel sides, its upper edge incurved; its extremity gradually narrowed, with a sharp and slightly upturned point. *Palp* with its tibia armed on its inner edge at the distal end beneath with three weak spines. Second abdominal *sternum* without modified bristles in front of the stigmata.

Length of body 11 mm.

Hab. ? Mexico [1–5].

The locality assigned to this species is probably erroneous, seeing that the remaining members of the genus *Dæsia* have been recorded only from Syria, Arabia, Cyprus, and Africa (from Algeria and Egypt to Cape Colony). But since there is in many particulars a faunistic similarity between the Mediterranean area of the Old World and the Sonoran district of North America, the possibility of the genus occurring in both continents must be borne in mind. At all events, the question as to the locality of *D. præcox* must be left undecided until the species, of which only the one typical example is at present known, has been rediscovered.

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[Names in small capitals refer to Families, &c.; those in roman type to the chief reference to each species included in the work; those in italics to species incidentally mentioned, synonyms, &c.]

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Væjovidæ 1
VÆJOVIS 8
Væjovis 4
—— *carolinianus* 24
—— cristimanus 11
—— *cristimanus* 8, 13
—— granulatus 10
—— *granulatus* 8
—— intrepidus 13
—— mexicanus 9
—— *mexicanus* 8, 10, 11, 13
—— ——, subsp. dugesi 9
—— ——, subsp. smithi 9
—— *nigrescens* 12, 13
—— *nigropictus* 12
—— nitidulus 12
—— *nitidulus* 8, 13
—— punctatus 12
—— *punctatus* 8, 13
—— pusillus 10
—— *pusillus* 8
—— subcristatus 10
—— *subcristatus* 8, 11
—— variegatus 11
—— *variegatus* 8, 12, 13
Vejovis 8
—— *cristimanus* 11
—— *granulatus* 10
—— *intrepidus* 13
—— *mexicanus* 9
—— *nitidulus* 12
—— *pusillus* 10
—— *spinigerus*, var. *punctata* .. 12
—— ——, var. *variegata* 11
—— *subcristatus* 10

ERRATA.

Page	Line	
24	32	for **Centrurus** read **Centruroides.**
32	37	for *Scopio* read *Scorpio*.

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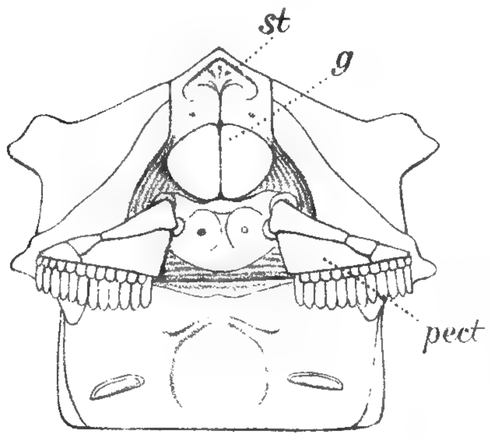
PLATE I.

Fig. 1. *Opisthacanthus lepturus,* Pal. de Beauv., ♂, nat. size: 1 *a,* carapace; 1 *b,* extremity of chelicera from below; 1 *c,* lower side of posterior end of cephalothorax and of anterior end of abdomen of ♂ (*st.,* sternum; *g.,* genital operculum; *pect.,* pecten); 1 *d,* ditto of ♀, with lettering as above; 1 *e,* lateral view of tail; 1 *f,* anterior side of tarsus of fourth leg with single pedal spur (*sp.*); 1 *g,* inferior view of same.

2. *Diplocentrus whitei,* Gerv., ♀, from San Diego, Texas, nat. size: 2 *a,* extremity of chelicera from below; 2 *b,* movable finger of chela; 2 *c,* sternum, genital operculum, and pectines; 2 *d,* lateral aspect of tail; 2 *e,* lateral view of tarsus of fourth leg (*sp.,* pedal spur); 2 *f,* lower view of same (*sp.,* pedal spur).

3. *Diplocentrus whitei* (Gervais), ♂, from San Diego, Texas, nat. size: 3 *a,* carapace and chela; 3 *b,* sternum, genital operculum, and pectines; 3 *c,* lateral view of tail; 3 *d,* lower side of the same.

4. *Diplocentrus keyserlingi,* Karsch, ♂, nat. size (specimen from Mexico): 4 *a,* carapace and chela; 4 *b,* lateral view of tail; 4 *c,* ditto from below.



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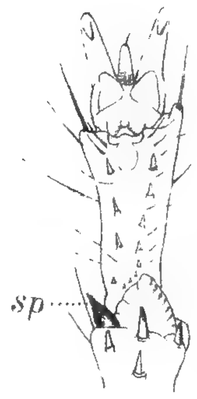

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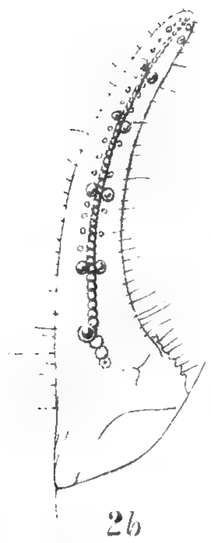
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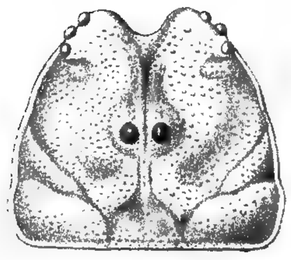
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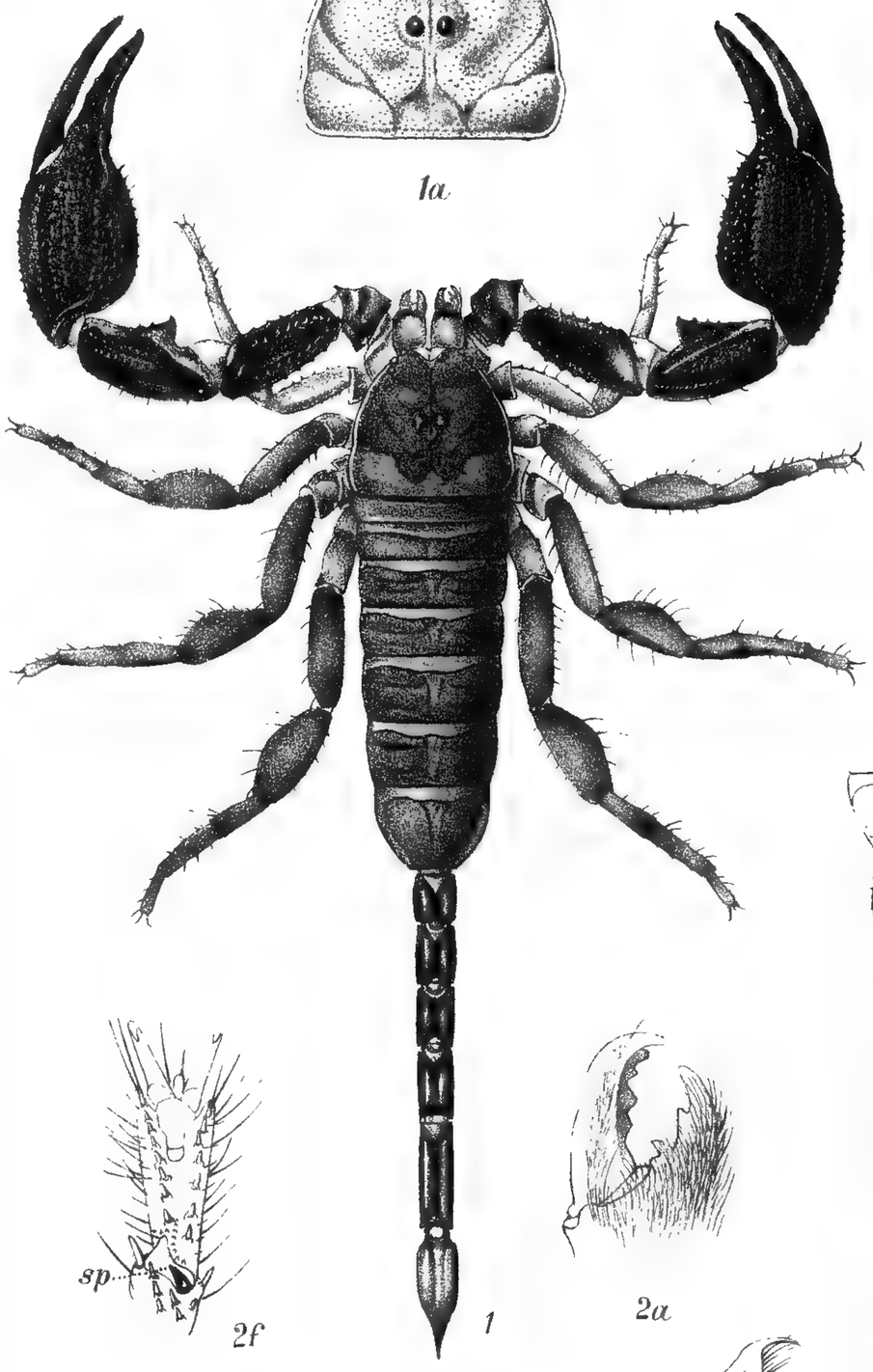
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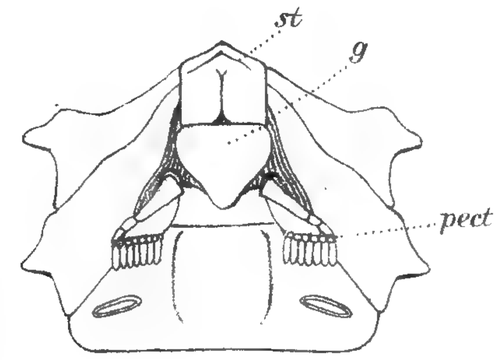


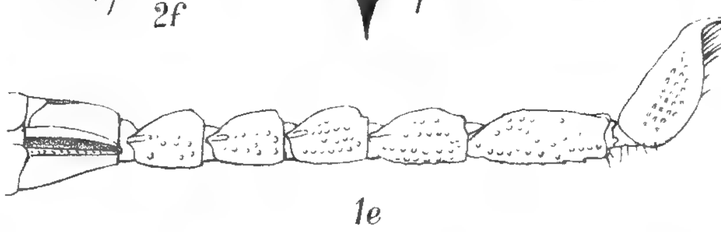
1d

1f

1b

2a

2f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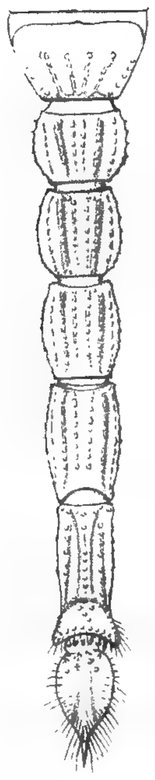
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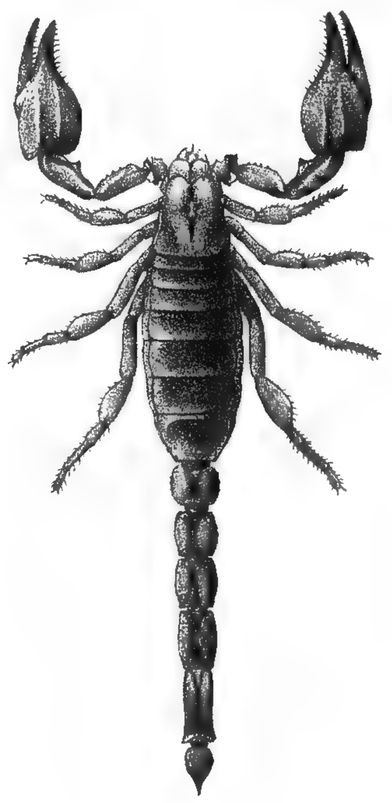
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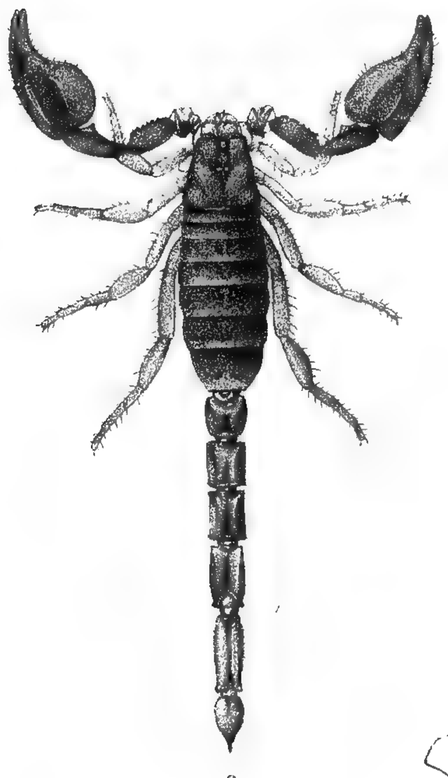
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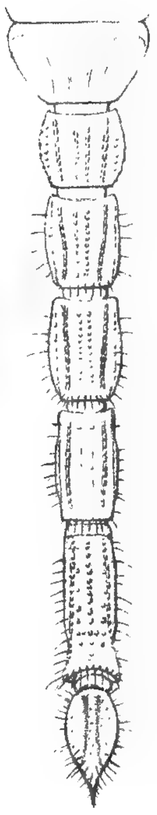
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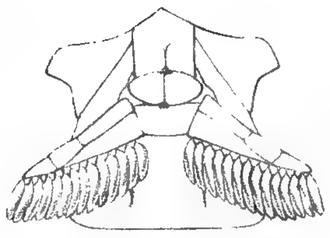
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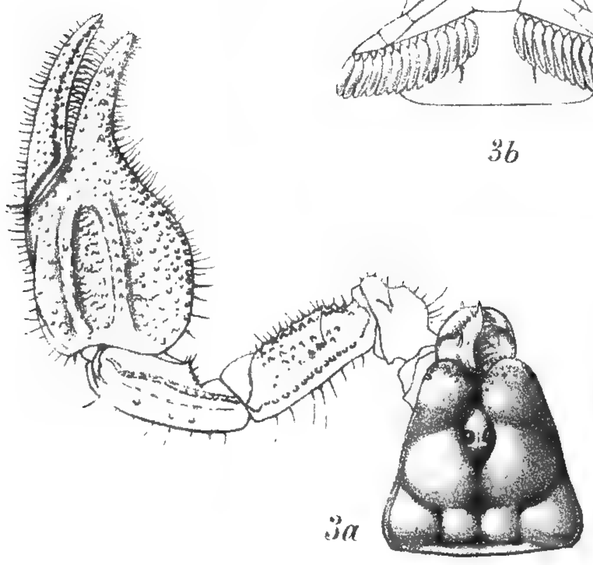
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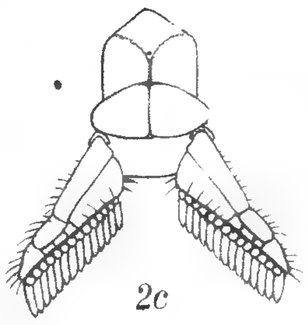
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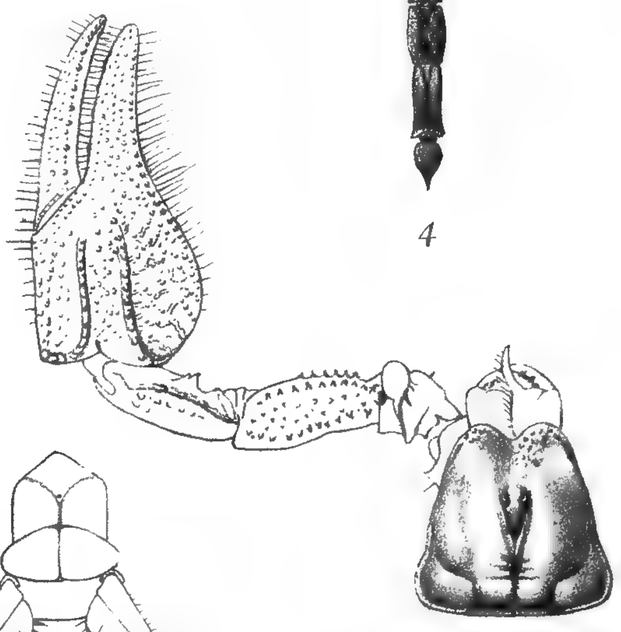
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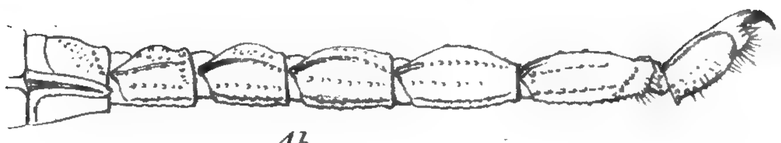
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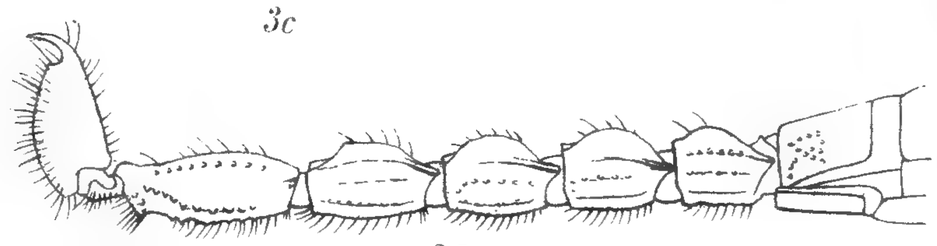
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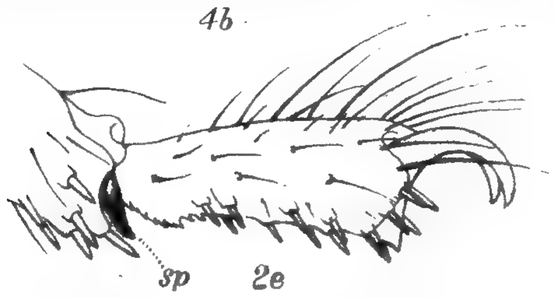


2e

1,1a-g OPISTHACANTHUS LEPTURUS. 3,3a-d DIPLOCENTRUS WHITEI.
2,2a-f DIPLOCENTRUS WHITEI. 4,4a-c " KEYSERLINGI.

A.T.Hollick,del. J.Green,lith. Mintern Bros. imp

PLATE II.

Fig. 1. *Hadrurus aztecus*, sp. n., ♂, from Jalapa, nat. size: 1 *a*, extremity of chelicera from below (*t.*, tooth on lower border of movable digit); 1 *b*, movable finger of chela; 1 *c*, sternum (*st.*), genital operculum (*g.*), and pecten (*pect.*); 1 *d*, lateral view of tarsus of fourth leg (*sp.*, pedal spurs; *cl.*, inferior claw); 1 *e*, carapace and chela; 1 *f*, last abdominal sternum.

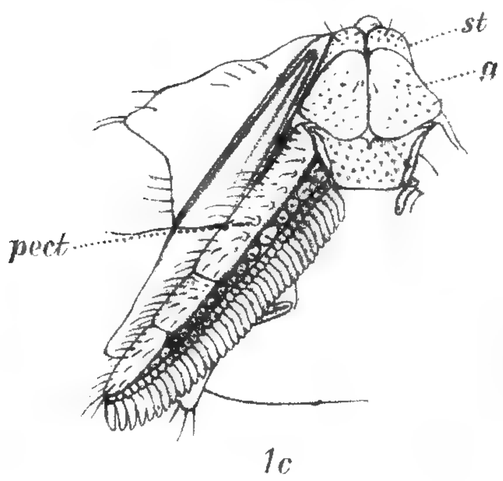
2. *Hadrurus hirsutus*, Wood, ♂, carapace and chela of specimen from San Bernardino; 2 *a*, extremity of abdomen from below.

3. *Væjovis mexicanus*, C. Koch, ♂, specimen from Mexico, nat. size: 3 *a*, carapace; 3 *b*, lateral surface of tail; 3 *c*, lower surface of same.

4. *Væjovis granulatus*, Poc., ♀, × 1½ (specimen from Mexico): 4 *a*, lateral surface of tail; 4 *b*, lower surface of same.

5. *Væjovis pusillus*, Poc., ♂, × 2: 5 *a*, carapace; 5 *b*, lateral surface of tail; 5 *c*, lower surface of same.

6. *Væjovis subcristatus*, Poc., ♂, nat. size (type from San Andres): 6 *a*, lateral surface of tail; 6 *b*, lower surface of same.



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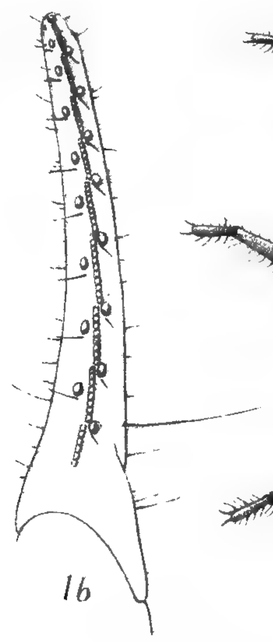
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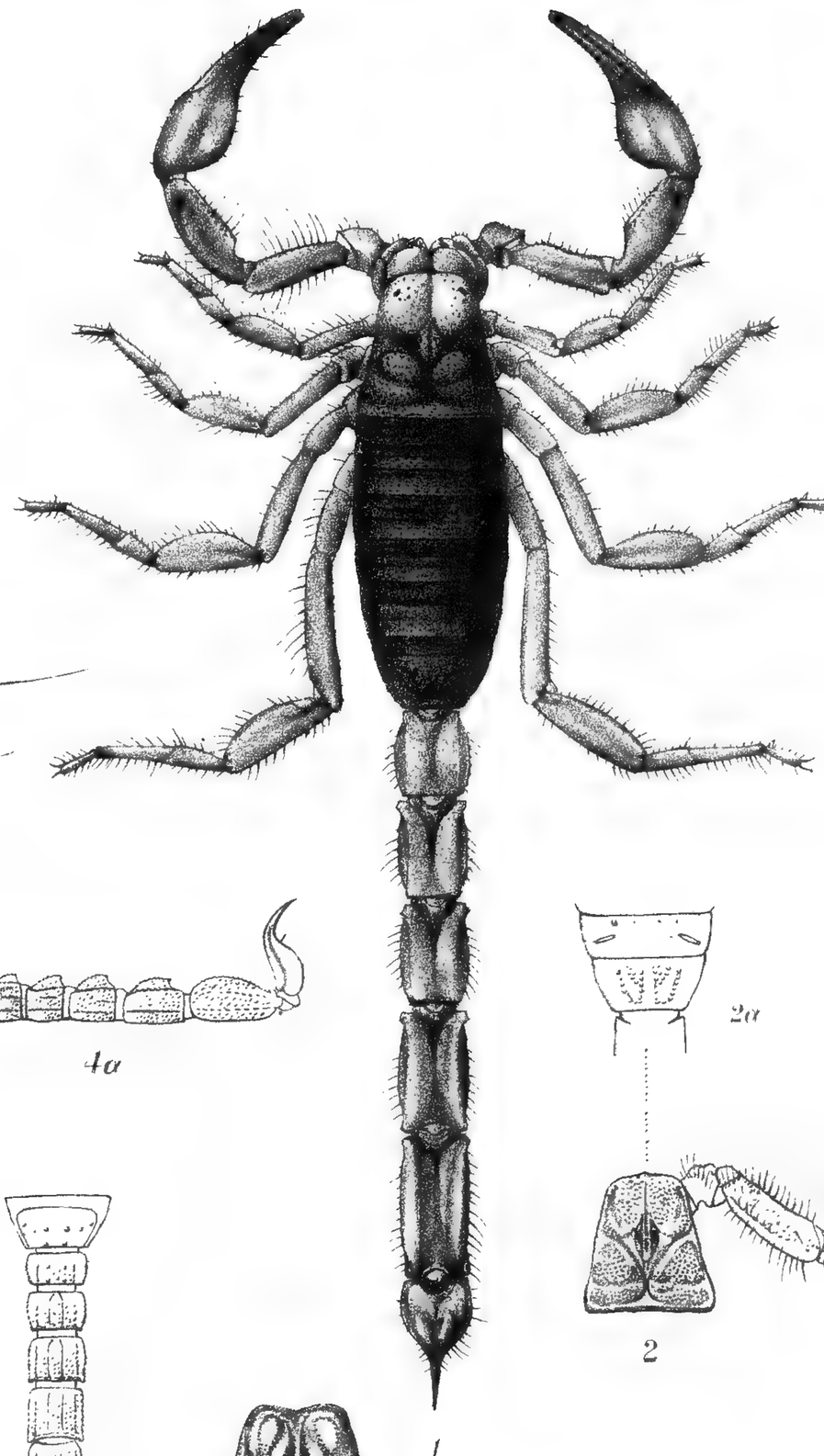

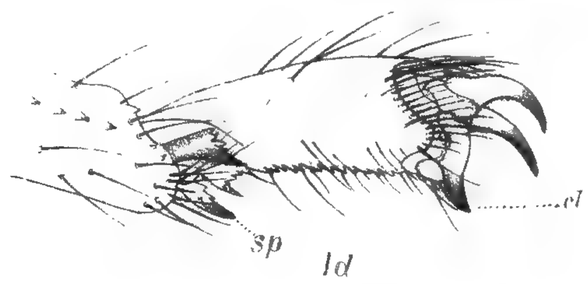

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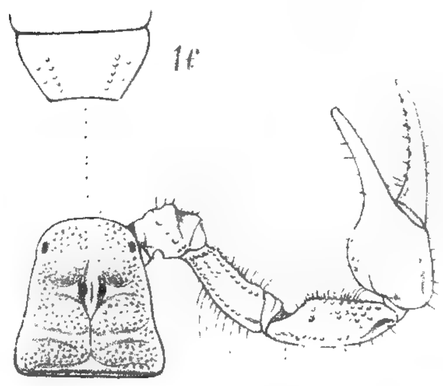
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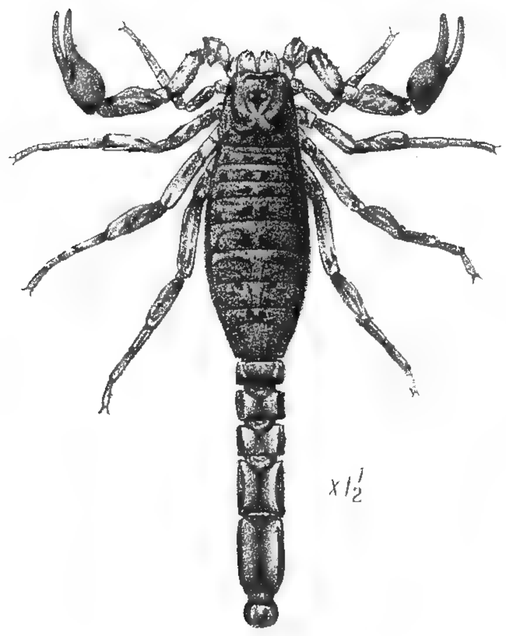
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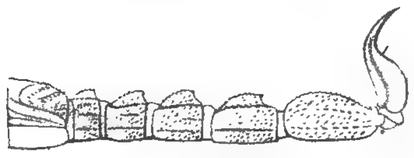
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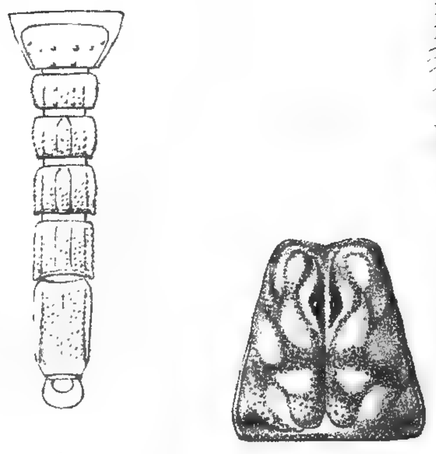
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3a

2a
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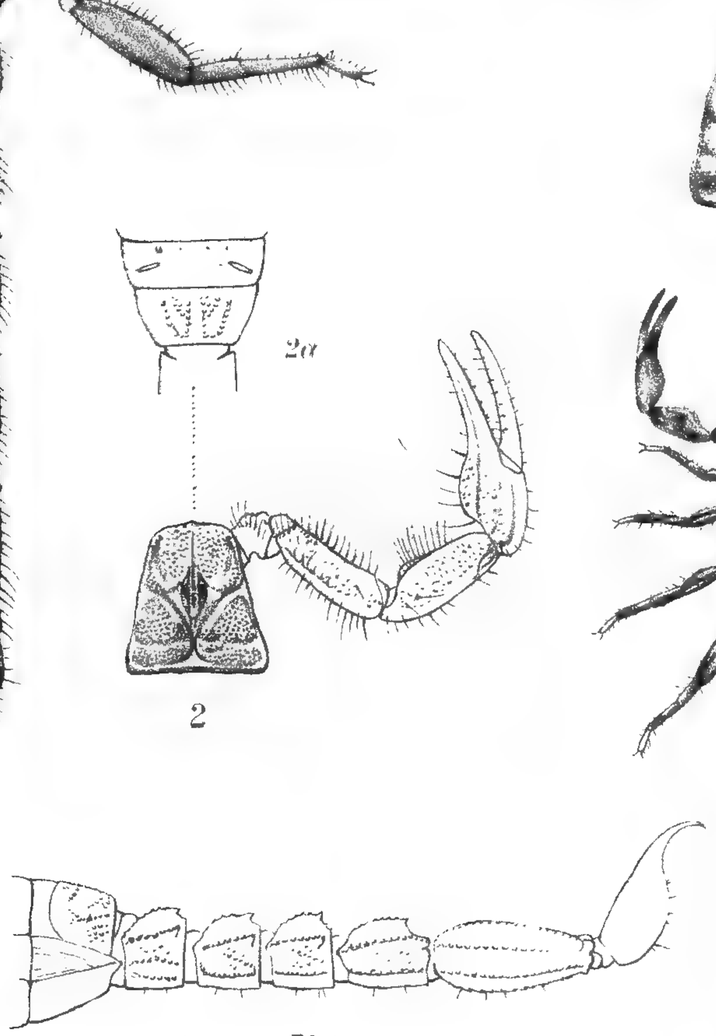
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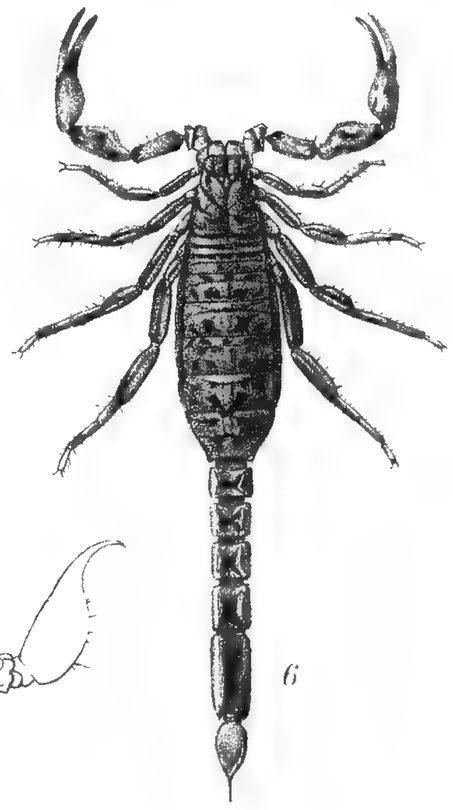
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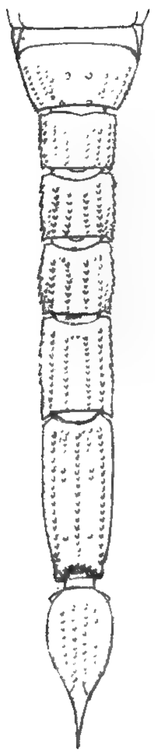
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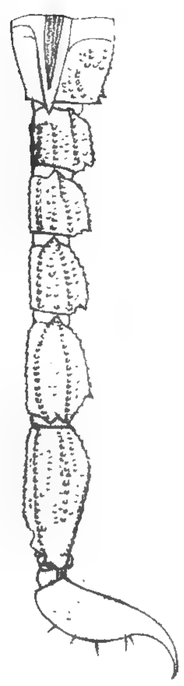
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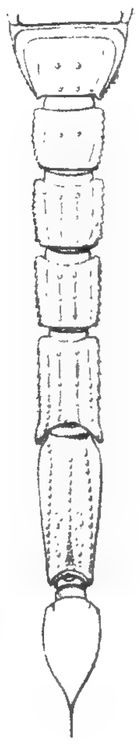
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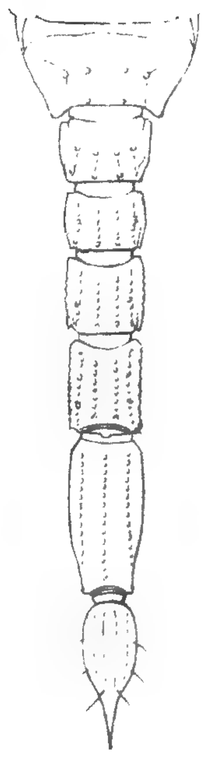
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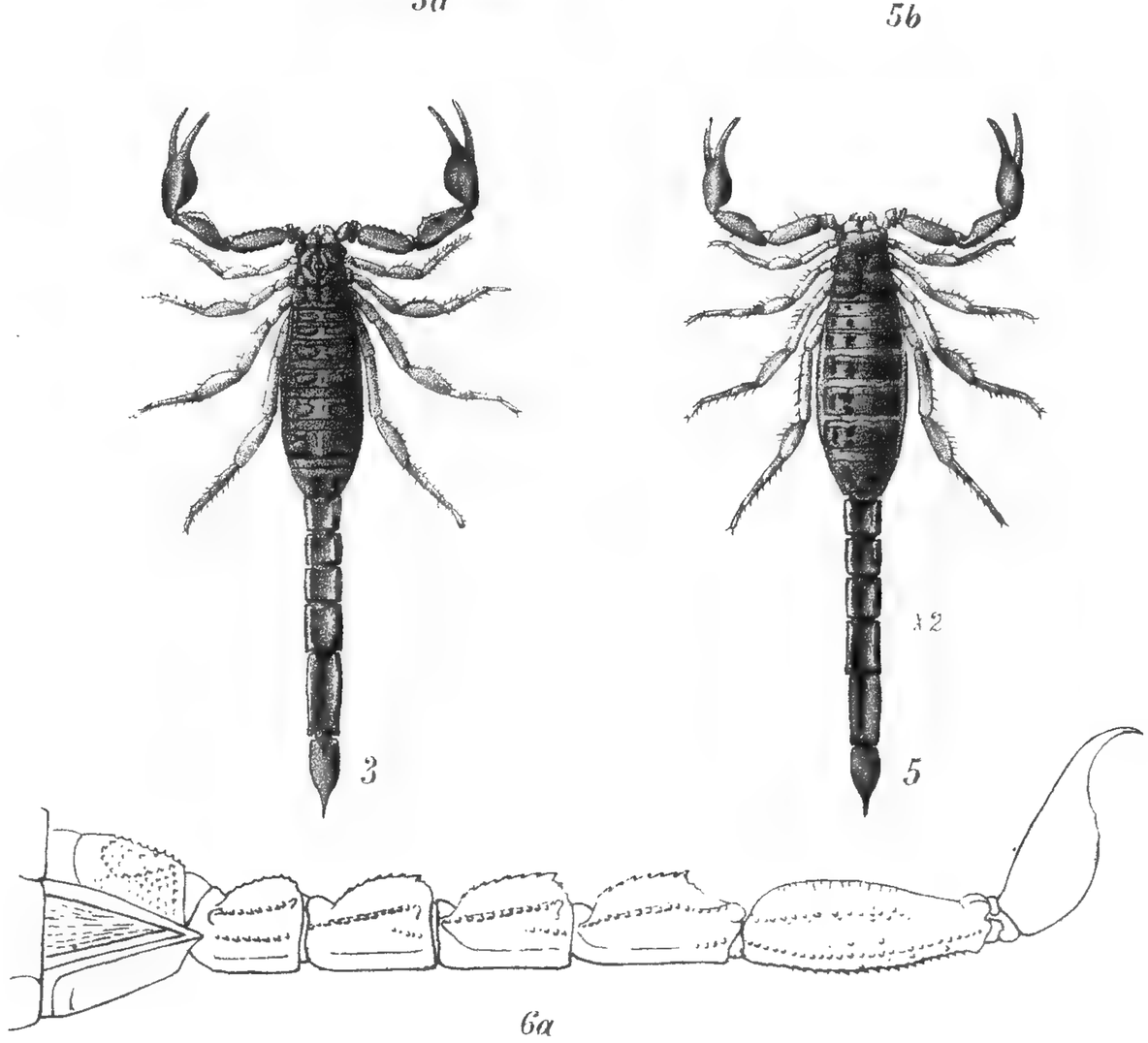

6a

1,1a-f HADRURUS AZTECUS.
2,2a " HIRSUTUS.
3,3a-c VÆJOVIS MEXICANUS.
4,4a,b " GRANULATUS.
5,5a-c VÆJOVIS PUSILLUS.
6,6a,b " SUBCRISTATUS.

A.T.Hollick, del. J.Green, lith.
Mintern Bros imp.

PLATE III.

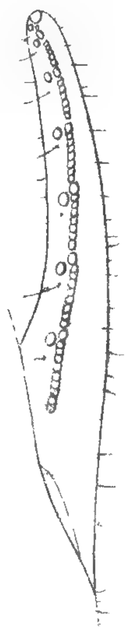
Fig. 1. *Væjovis cristimanus,* Poc., typical specimen from Zacatecas, nat. size: 1 *a,* carapace; 1 *b,* digits of mandibles from below; 1 *c,* lateral side of tail; 1 *d,* inferior side of same.

2. *Væjovis variegatus,* Poc., typical specimen from Omilteme, nat. size: 2 *a,* carapace and chela; 2 *b,* extremity of mandible from above; 2 *c,* sternum (*st.*) of cephalothorax, genital operculum (*g.*), pectines (*pect.*), and first abdominal sternum; 2 *d,* dentition of movable finger of chela; 2 *e,* anterior side of foot of fourth leg (*sp.*, pedal spur); 2 *f,* inferior surface of same (*sp.*, spurs); 2 *g,* lower side of tail; 2 *h,* lateral side of same.

3. *Væjovis nitidulus,* Karsch, type of *V. nigrescens,* Poc., nat. size: 3 *a,* carapace and chela; 3 *b,* lateral side of tail; 3 *c,* inferior side of same.

4. *Anuroctonus phæodactylus,* Wood (♀), specimen from Denver, nat. size: 4 *a,* extremity of mandible from below; 4 *b,* movable finger of chela, to show dentition; 4 *c,* sternum (*st.*), genital operculum (*g*), and pectines (*pect.*); 4 *d,* lateral side of tail; 4 *e,* inferior side of same.

2g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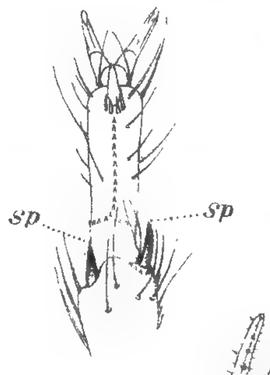

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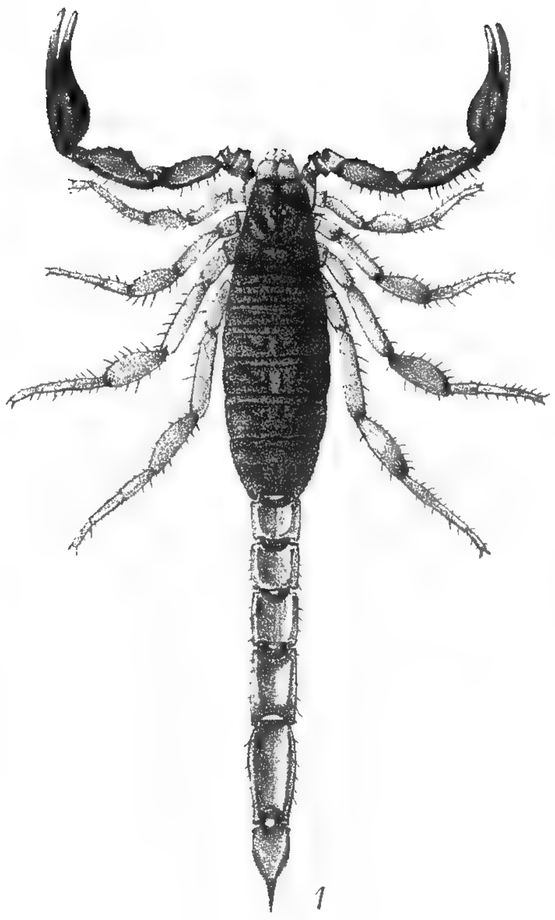
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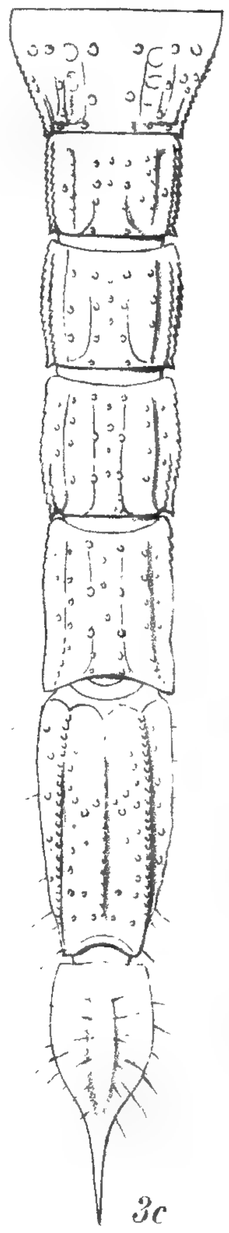
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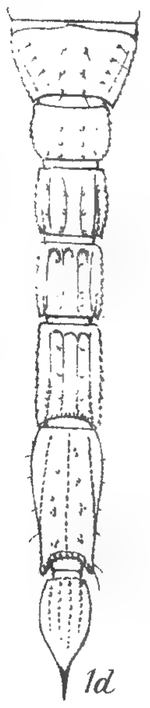
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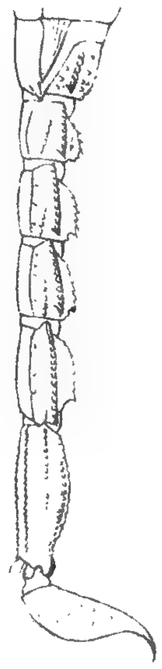
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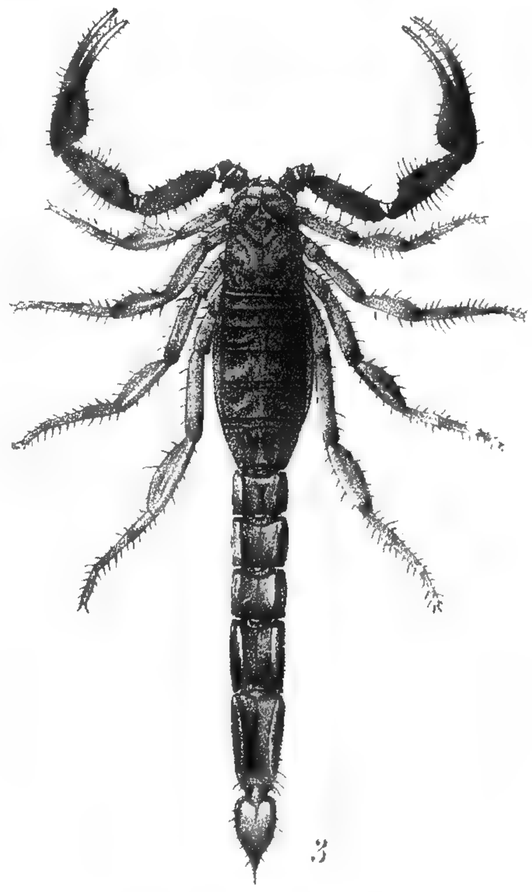
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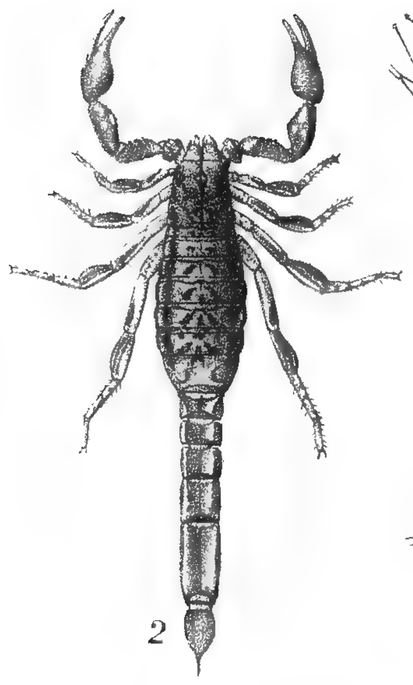
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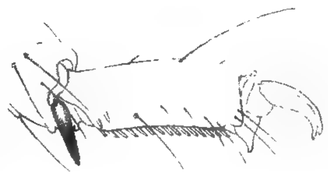
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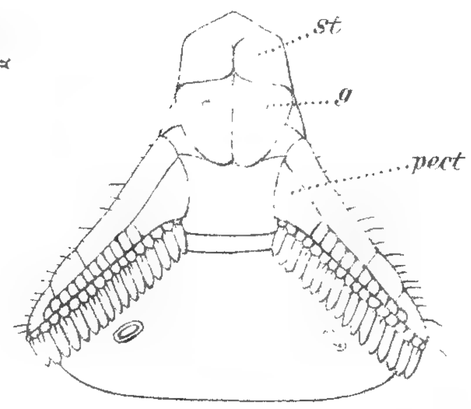

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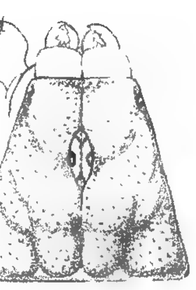
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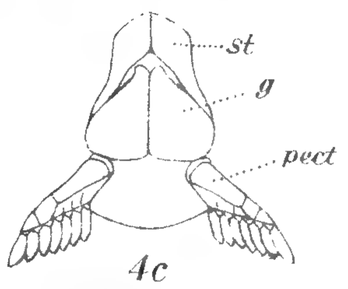
2b

3a



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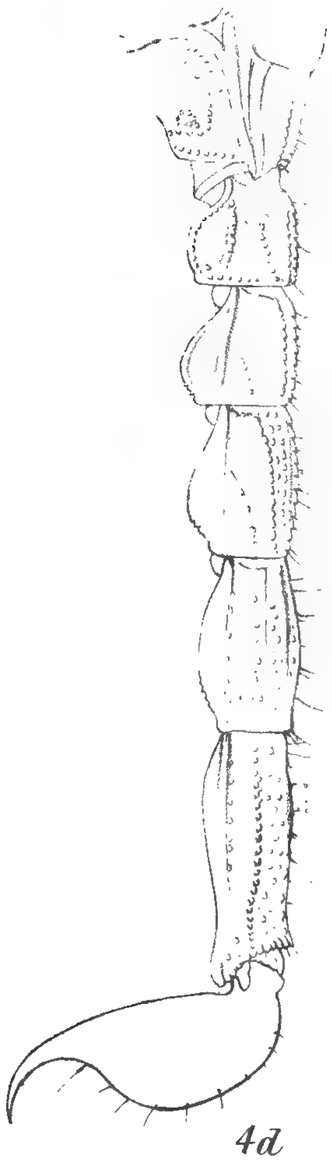
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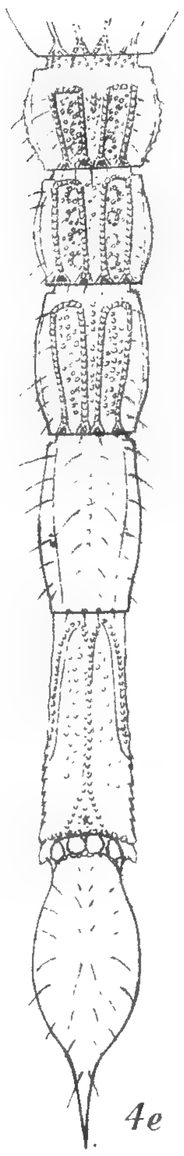
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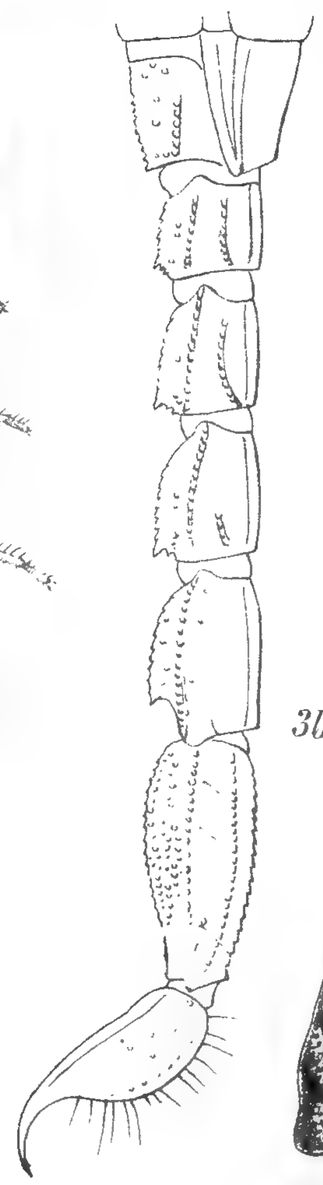
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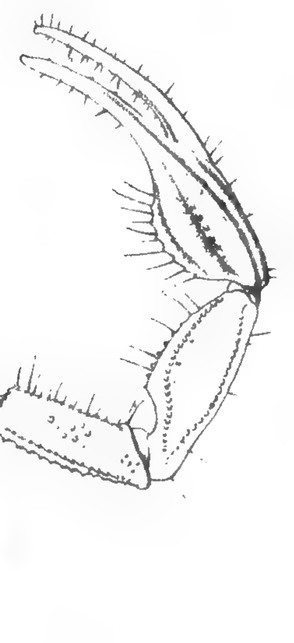

3a

1,1 a-d VÆJOVIS CRISTIMANUS. 3,3 a-c VÆJOVIS NITIDULUS.
2,2 a-h " VARIEGATUS. 4,4 a-e ANUROCTONUS PHÆODACTYLUS.

A.T.Hollick,del. J.Green,lith.

Mintern Bros. imp.

PLATE IV.

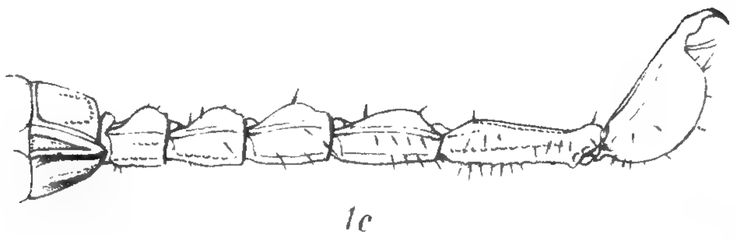
Fig. 1. *Anuroctonus phœodactylus,* Wood, ♂, example from San Bernardino: 1 *a,* sternum, genital operculum, and pectines; 1 *b,* anterior side of foot of fourth leg; 1 *c,* lateral side of tail.

2. *Uroctonus mordax,* Thor., specimen from California, nat. size: 2 *a,* extremity of mandible from below; 2 *b,* movable finger of chela, to show dentition; 2 *c,* sternum, genital operculum, pectines, and first abdominal sternum; 2 *d,* anterior side of foot of fourth leg; 2 *e,* lower side of tail; 2 *f,* lateral side of same.

3. *Broteochactas delicatus,* Karsch, ♀, specimen from British Guiana, nat. size: 3 *a,* carapace and chela; 3 *b,* extremity of mandible from above; 3 *c,* movable finger of chela, showing dentition; 3 *d,* foot of fourth leg, posterior side; 3 *e,* lower side of trunk and tail; 3 *f,* lateral surface of tail.

4. *Broteochactas delicatus,* Karsch, ♂, type specimen of *Broteas panamensis,* Thor., nat. size: 4 *a,* lower side of anterior extremity, showing sternum (*st.*), genital operculum (*g.*), and pectines (*pect.*); 4 *b,* lateral surface of extremity of tail.

5. *Plesiochactas dilutus,* Karsch, type specimen of *P. dugesi,* Poc., × 1½: 5 *a,* carapace and chela; 5 *b,* anterior extremity from below, showing sternum (*st.*), genital operculum (*g.*), and pectines (*pect.*); 5 *c,* pecten; 5 *d,* one of the stigmata; 5 *e,* lower side of tail; 5 *f,* lateral surface of posterior end of tail.



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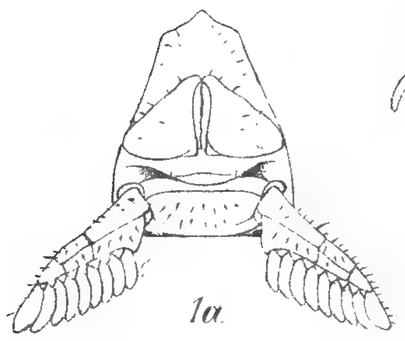
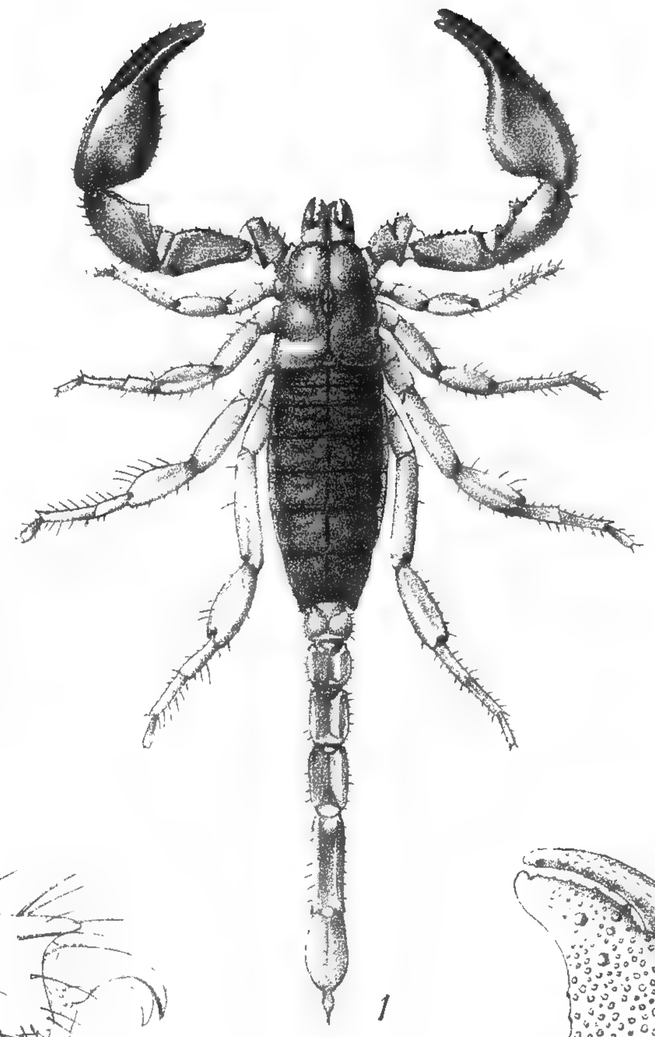


1a

1b

2a



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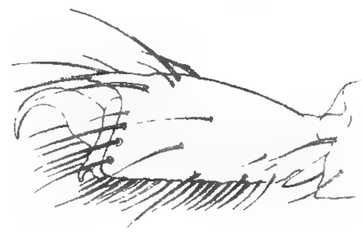

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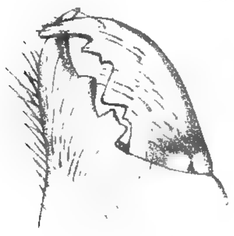

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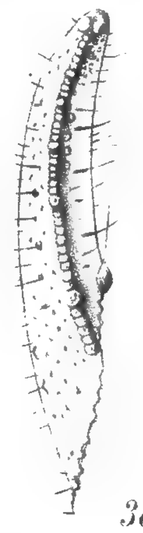

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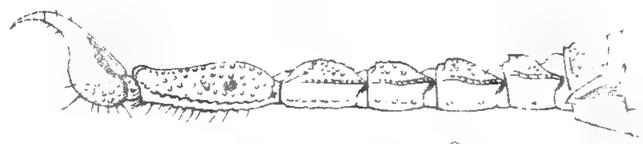

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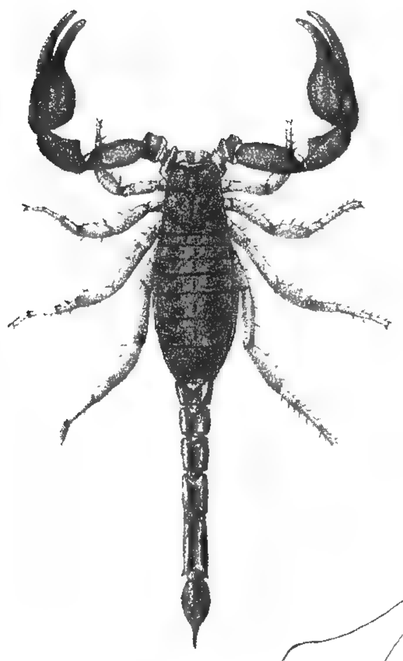

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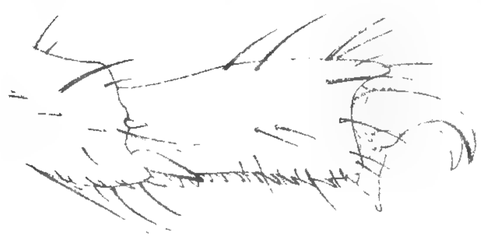

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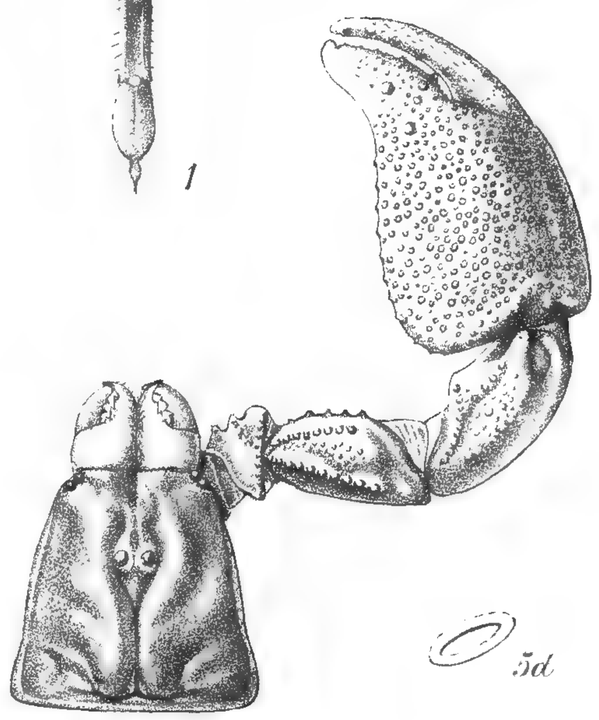

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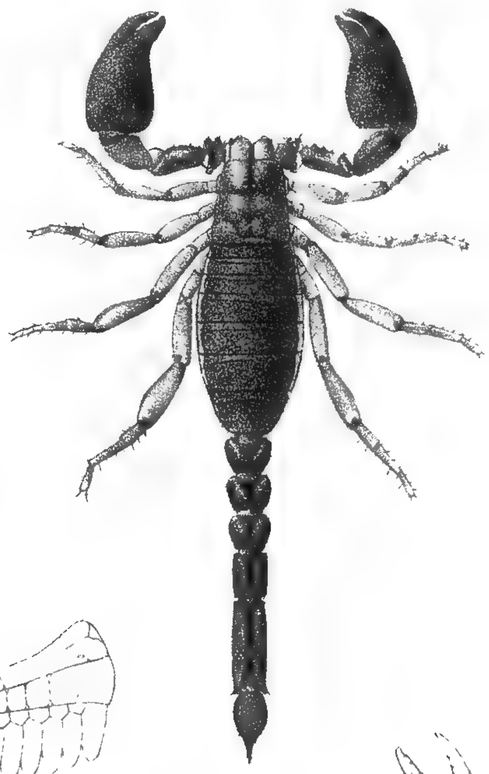

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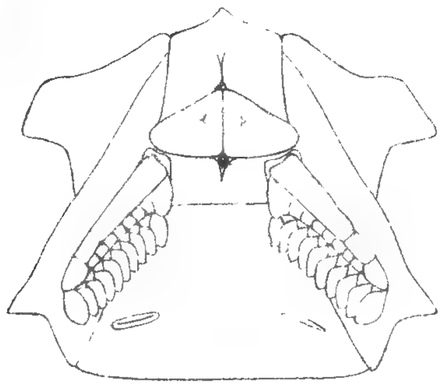

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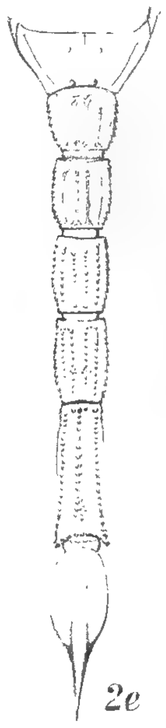

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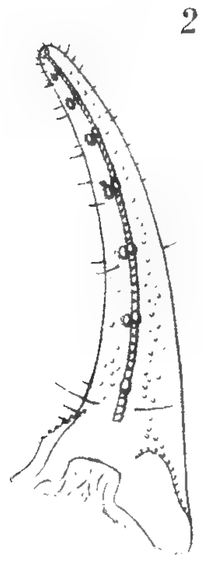

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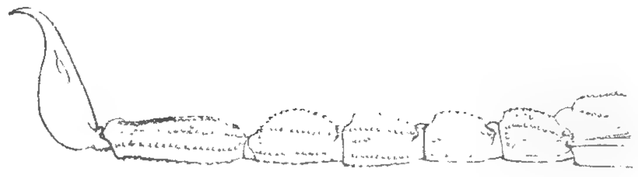

2f

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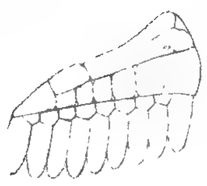
5b



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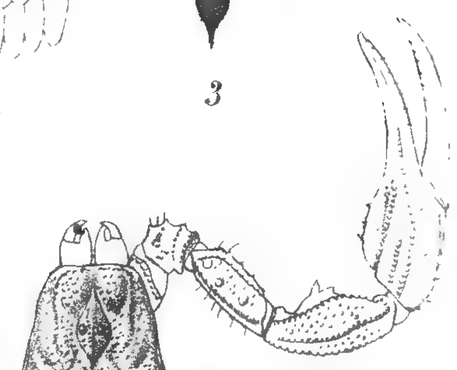

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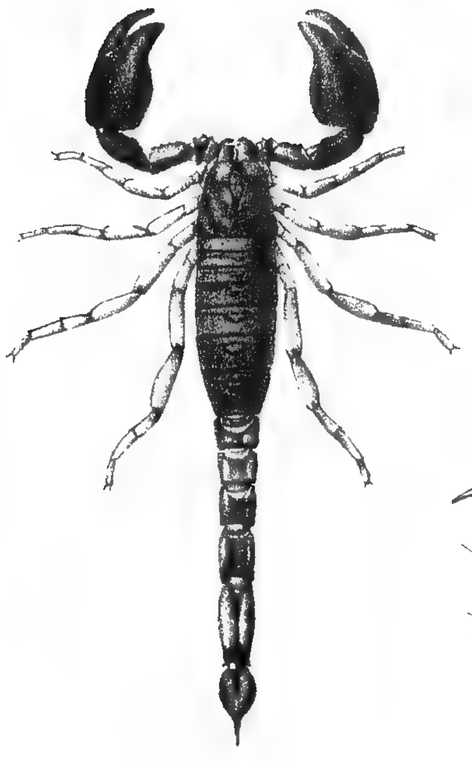

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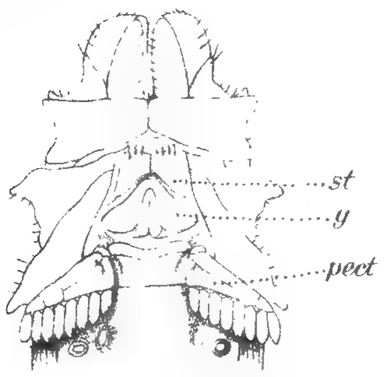

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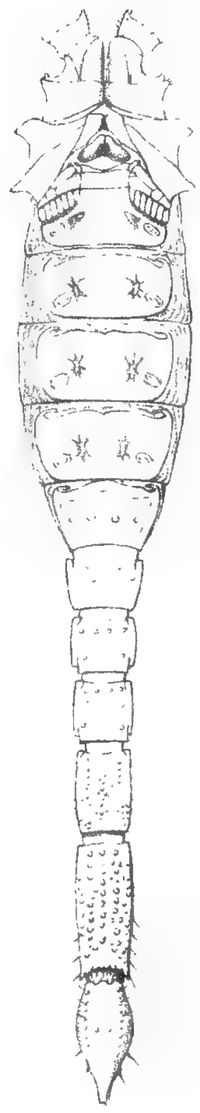
4a

4b



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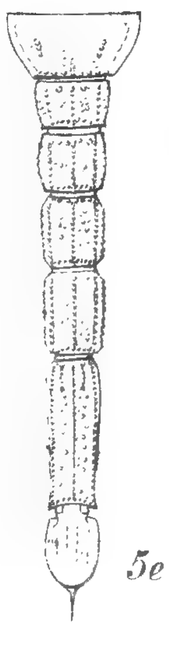

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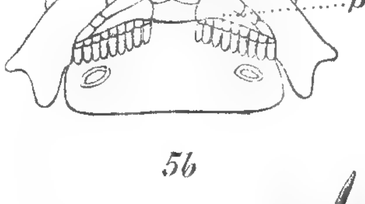


5f

5

1, 1 a-c ANUROCTONUS PHÆODACTYLUS.
2, 2 a-f UROCTONUS MORDAX.

3, 3 a-f, 4, 4 a-b BROTEOCHACTAS DELICATUS.
5, 5 a-f PLESIOCHACTAS DILUTUS.

A.T.Hollick, del. J.Green, lith.

Mintern Bros. imp.

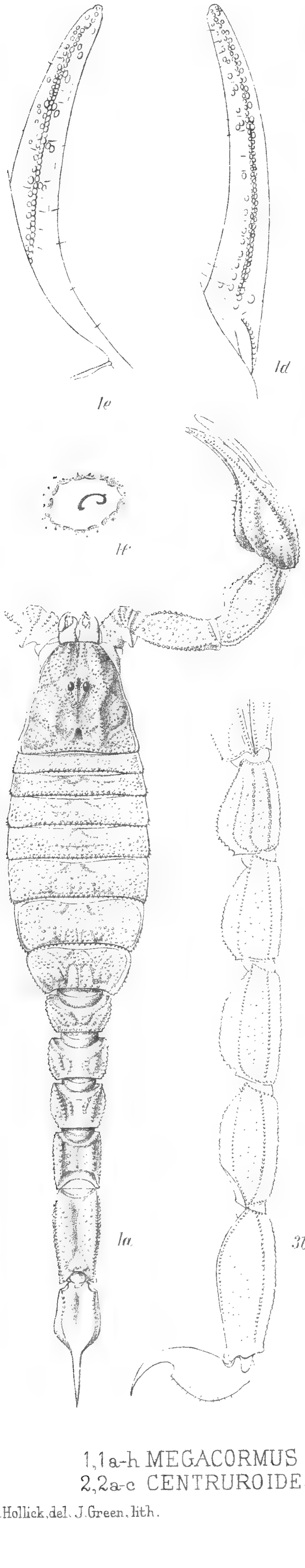
PLATE V.

Fig. 1. *Megacormus granosus* (Gerv.), specimen from Huatusco, ♂, nat. size: 1 *a*, dorsal surface, with legs and left chela removed; 1 *b*, ventral surface of the same; 1 *c*, extremity of chelicera from above; 1 *d*, movable, and 1 *e*, immovable digit of chela; 1 *f*, one of the stigmata; 1 *g*, lateral surface of tail; 1 *h*, tarsus of third foot.

2. *Centruroides thorelli*, Kraep., ♀, nat. size, specimen from Guatemala: 2 *a*, lateral view of tail of ♀. 2 *b*, *Centruroides thorelli*, Kraep., ♂, nat. size, specimen from Tecpam: 2 *c*, lateral view of tail of ♂.

3. *Centruroides elegans*, Thor., ♀, nat. size, specimen from Amula: 3 *a*, ♂, ditto; 3 *b*, lateral view of tail of ♀; 3 *c*, ditto of extremity of tail of ♂.

4. *Centruroides elegans*, Thor., subsp. *nigrovariatus*, Poc., ♂, nat. size, type from Oaxaca: 4 *a*, lateral view of tail.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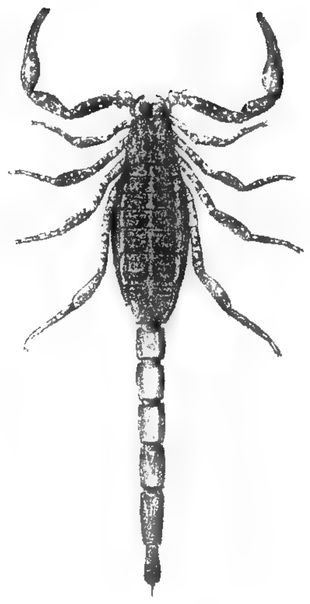
1d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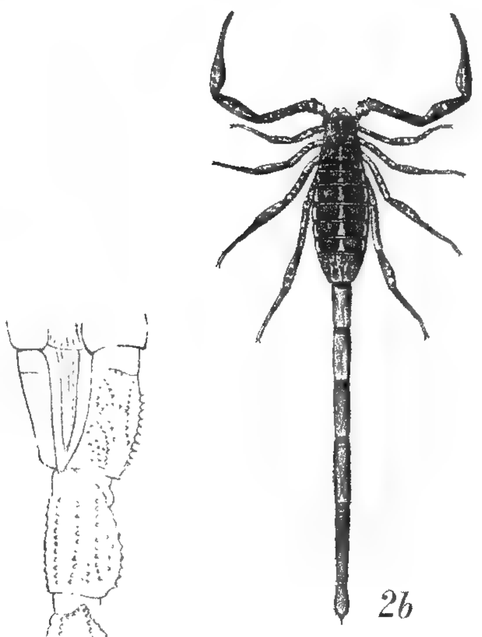
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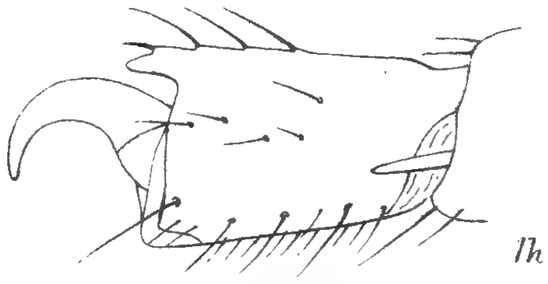
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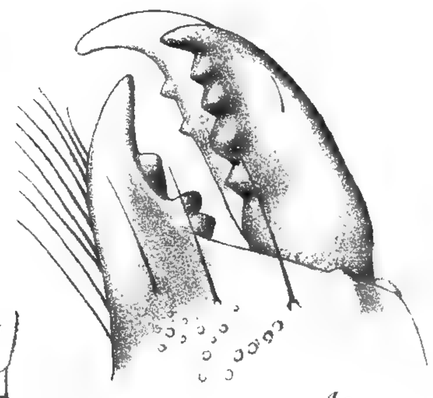

1c

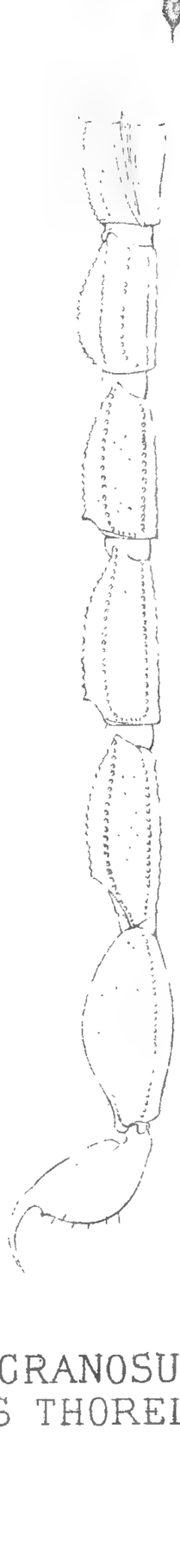
1a

1b

1g

1f

3b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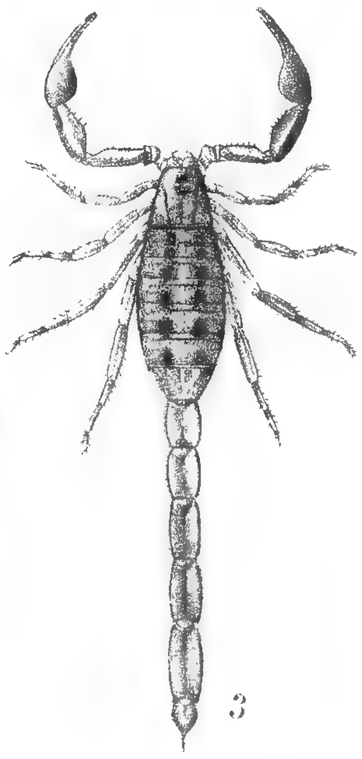
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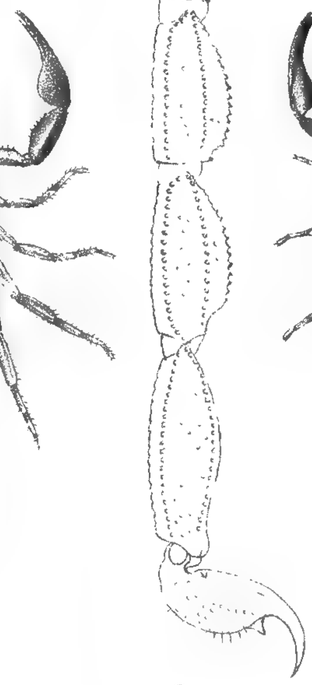
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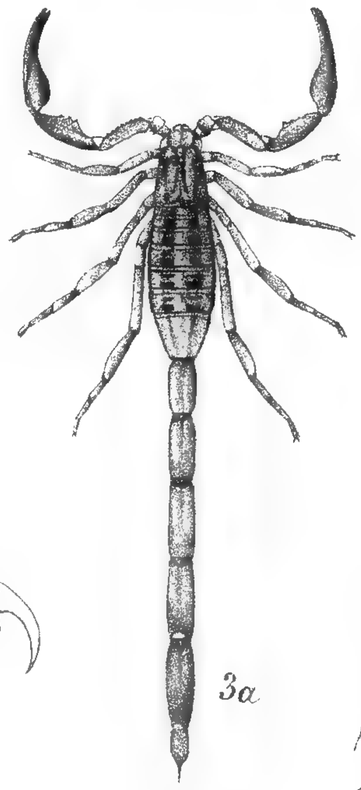
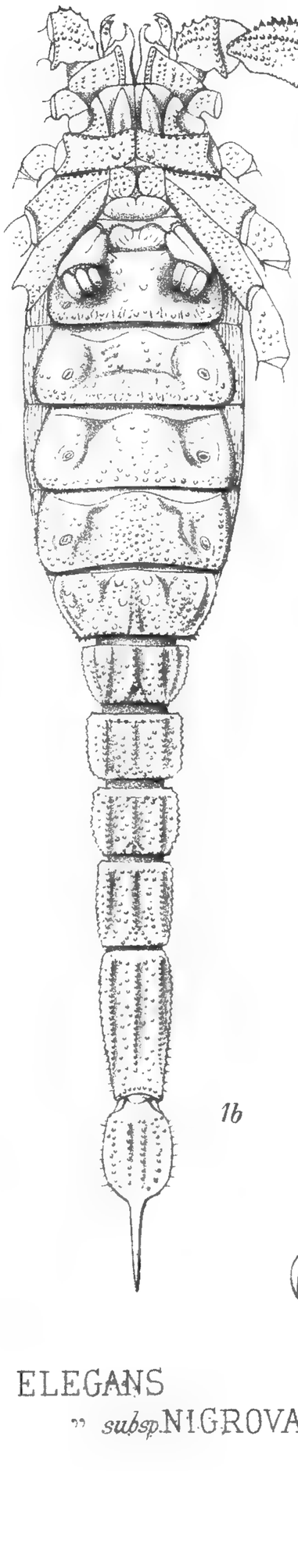

3a

3a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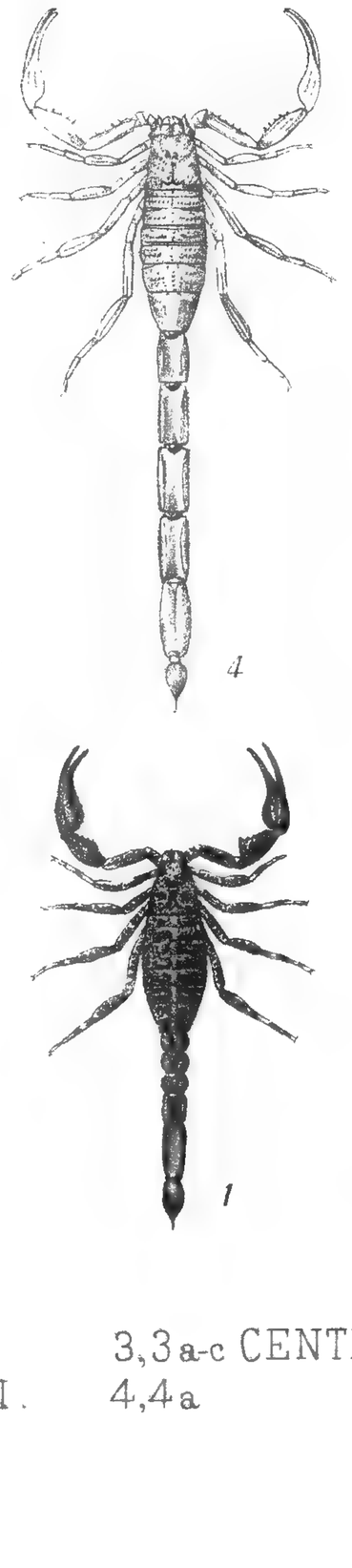
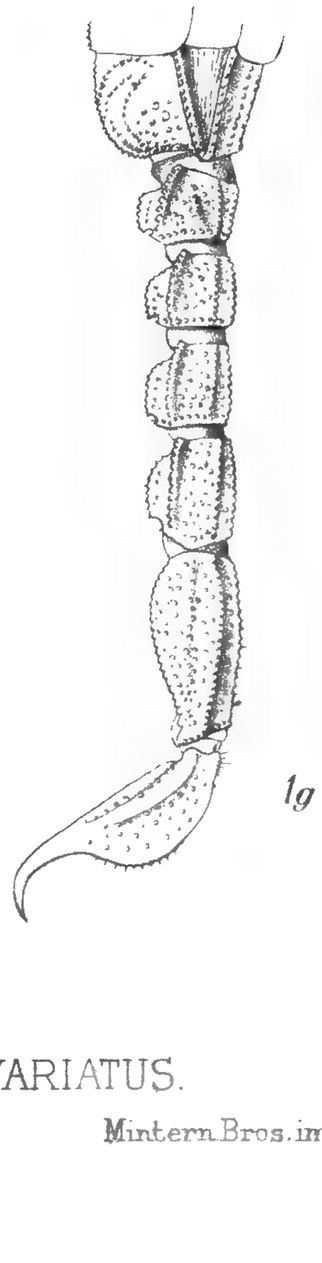

4a

4

1

2c

1b


1g

1,1a-h MEGACORMUS GRANOSUS.
2,2a-c CENTRUROIDES THORELLI.
3,3a-c CENTRUROIDES ELEGANS
4,4a " " *subsp.* NIGROVARIATUS.

A.T.Hollick,del. J.Green,lith. Mintern Bros. imp.

PLATE VI.

Fig. 1. *Centruroides vittatus,* Say, ♀, nat. size, specimen from San Diego, Texas: 1 *a,* lateral view of tail of ♀; 1 *b,* ditto of ♂.

2. *Centruroides vittatus,* Say, subsp. *suffusus,* Poc., lateral view of the extremity of tail of ♂, specimen from Ventanas; 2 *a,* ditto of ♀, also from Ventanas.

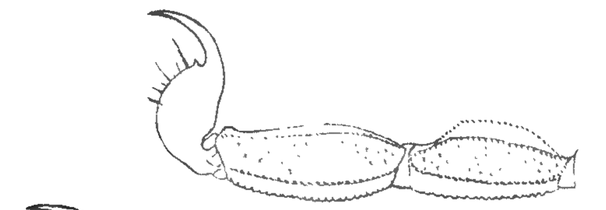
3. *Centruroides ornatus,* Poc., ♀, × 1½, type-specimen from Jalisco: 3 *a,* lateral view of extremity of tail of ♀; 3 *b,* ditto of ♂.

4. *Centruroides subgranosus,* Kraep., ♀, × 1½, co-typical example: 4 *a,* lateral view of extremity of tail; 4 *b,* upperside of right chela.

5. *Centruroides nitidus,* Thor., carapace and chela of ♀ specimen ticketed Brazil; 5 *a,* lateral view of tail of ♀; 5 *b,* ditto of ♂.

6. *Centruroides flavopictus,* Poc., ♂, nat. size, specimen from Jalapa: 6 *a,* ditto, ♀; 6 *b,* chela of ♂; 6 *c,* lateral view of posterior end of tail of ♂; 6 *d,* ditto of ♀.

7. *Centruroides ochraceus,* Poc., ♀, nat. size, specimen from Yucatan: 7 *a,* ditto, ♂; 7 *b,* right chela of ♂; 7 *c,* lateral view of tail of ♀; 7 *d,* ditto of ♂.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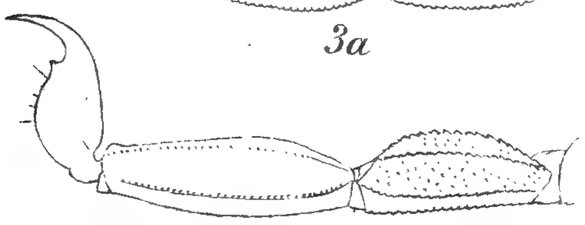
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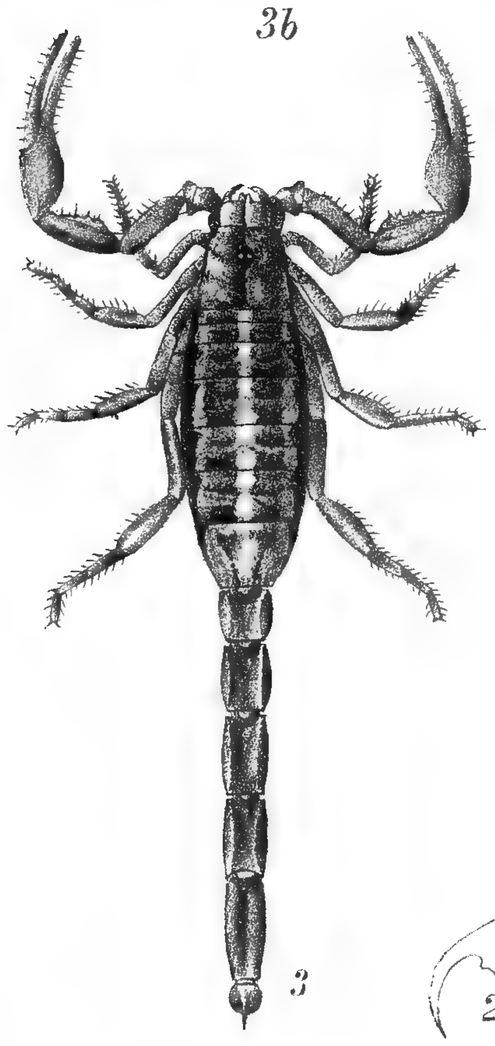
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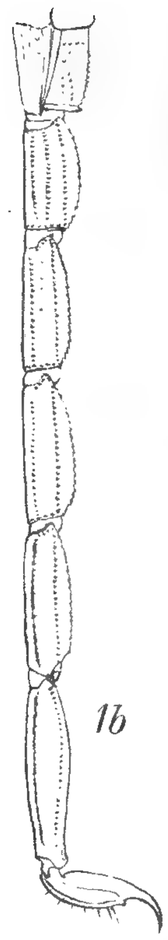
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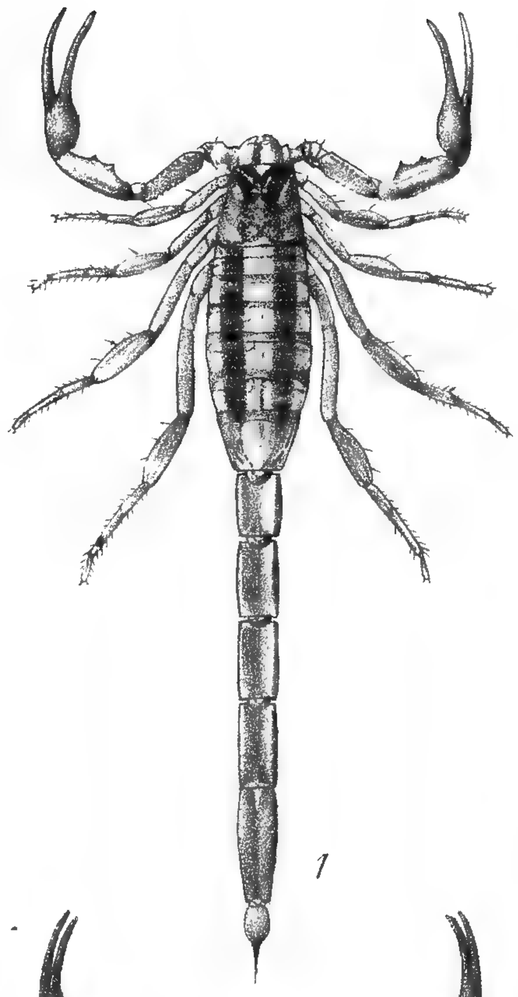
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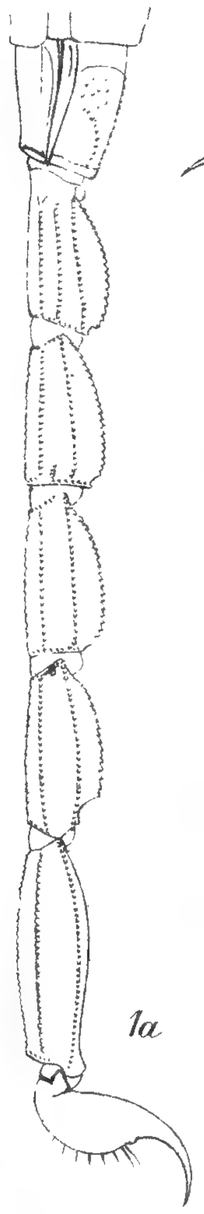
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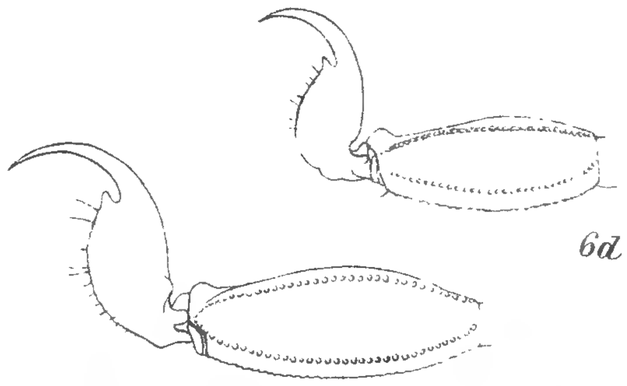
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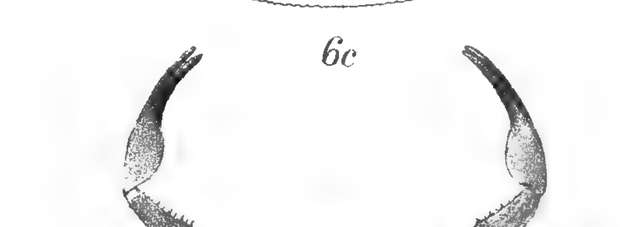
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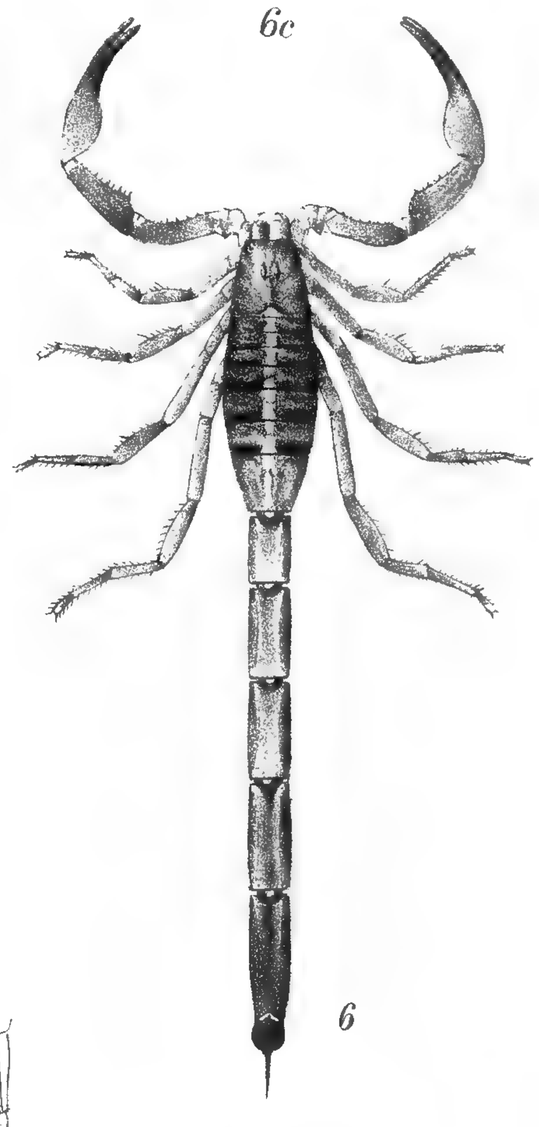
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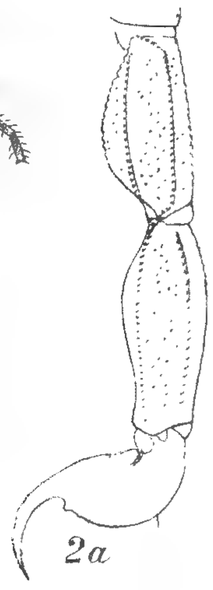
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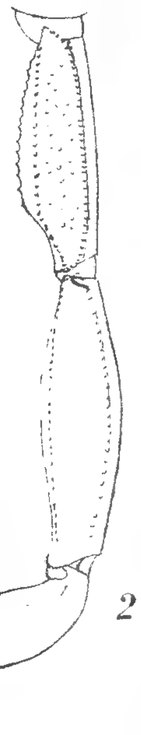
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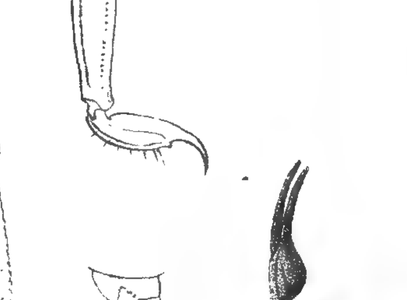
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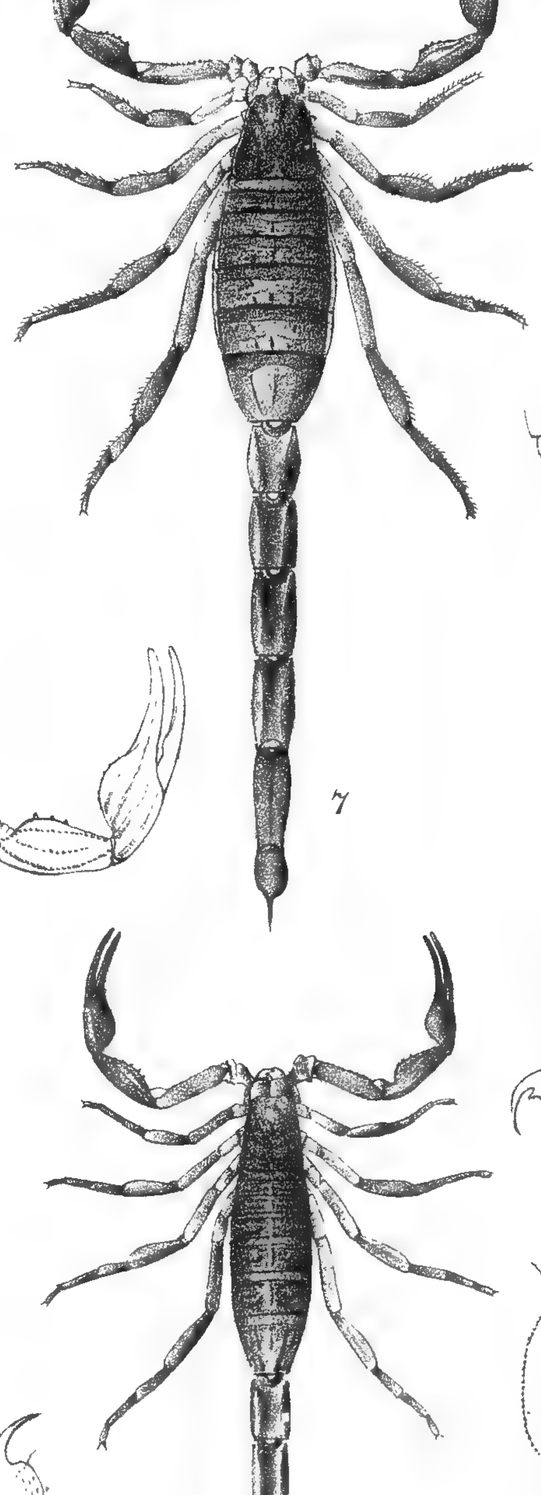
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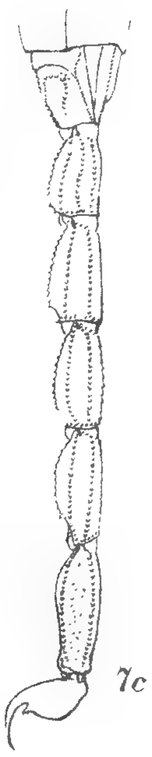
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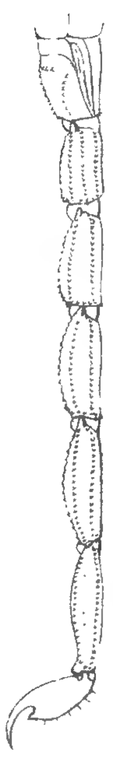
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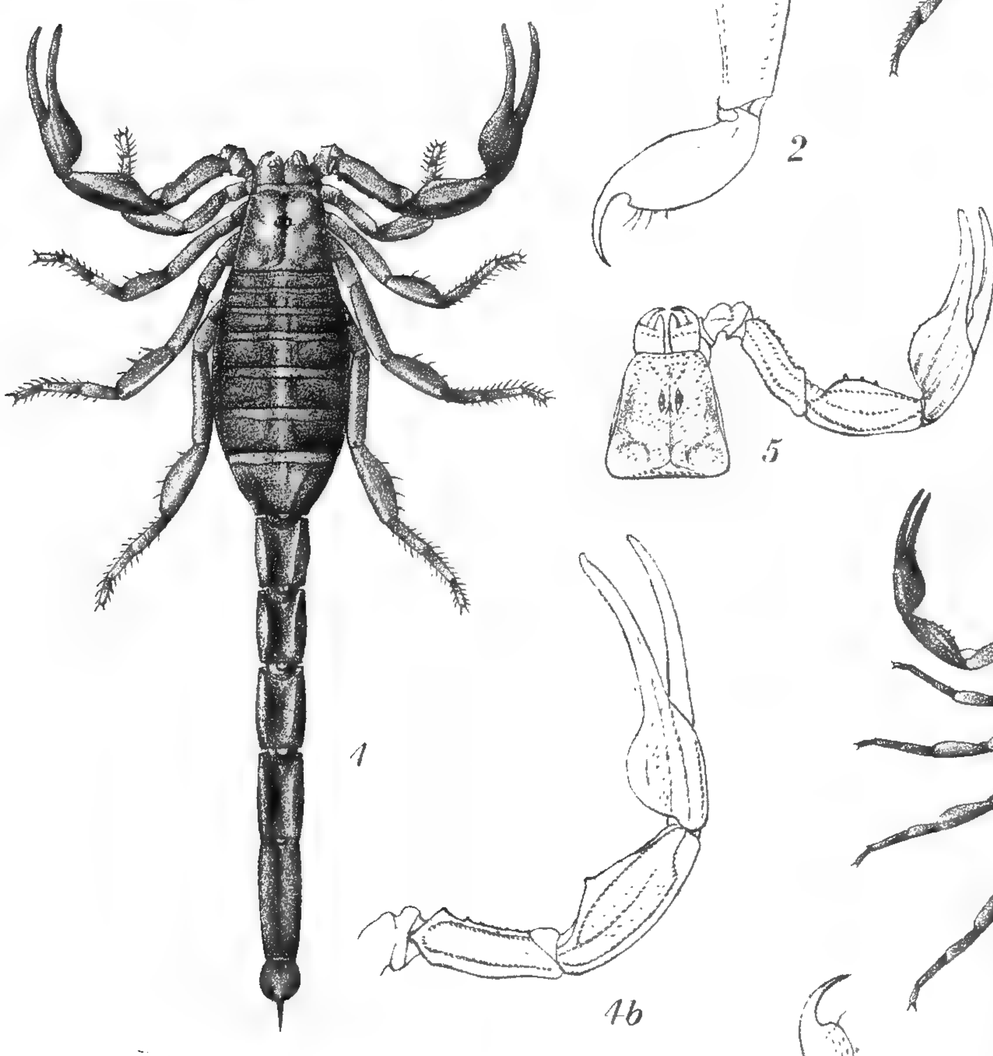
6a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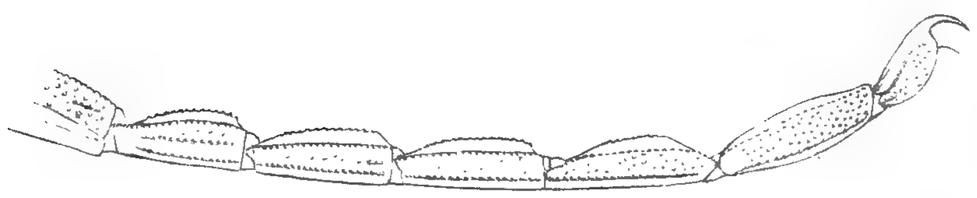
1b

5a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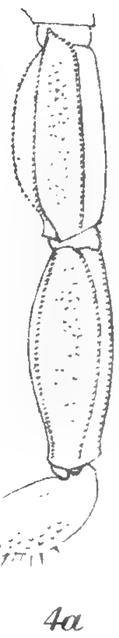
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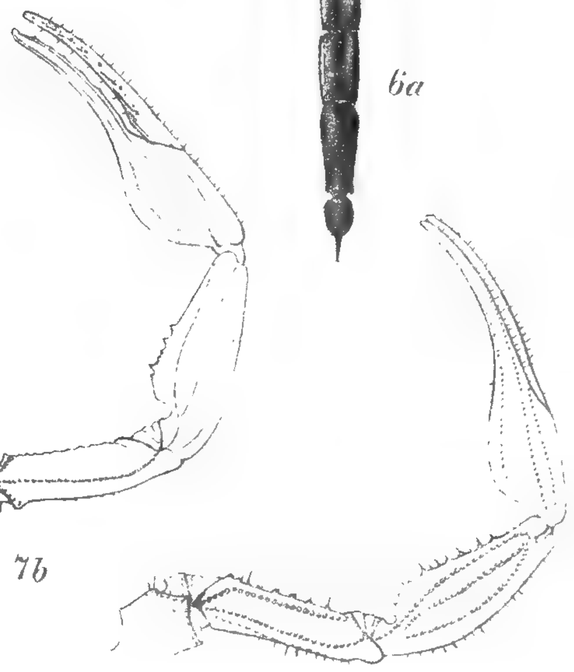

7b

6b

1,1a,b CENTRUROIDES VITTATUS.
2,2a " "*subsp.* SUFFUSUS.
3,3a,b CENTRUROIDES ORNATUS.
4,4a,b " SUBGRANOSUS.
5,5a,b " NITIDUS.
6,6a-d CENTRUROIDES FLAVOPICTUS.
7,7a-d " OCHRACEUS.

A.T.Hollick,del. J.Green,lith. Mintern Bros. imp.

PLATE VII.

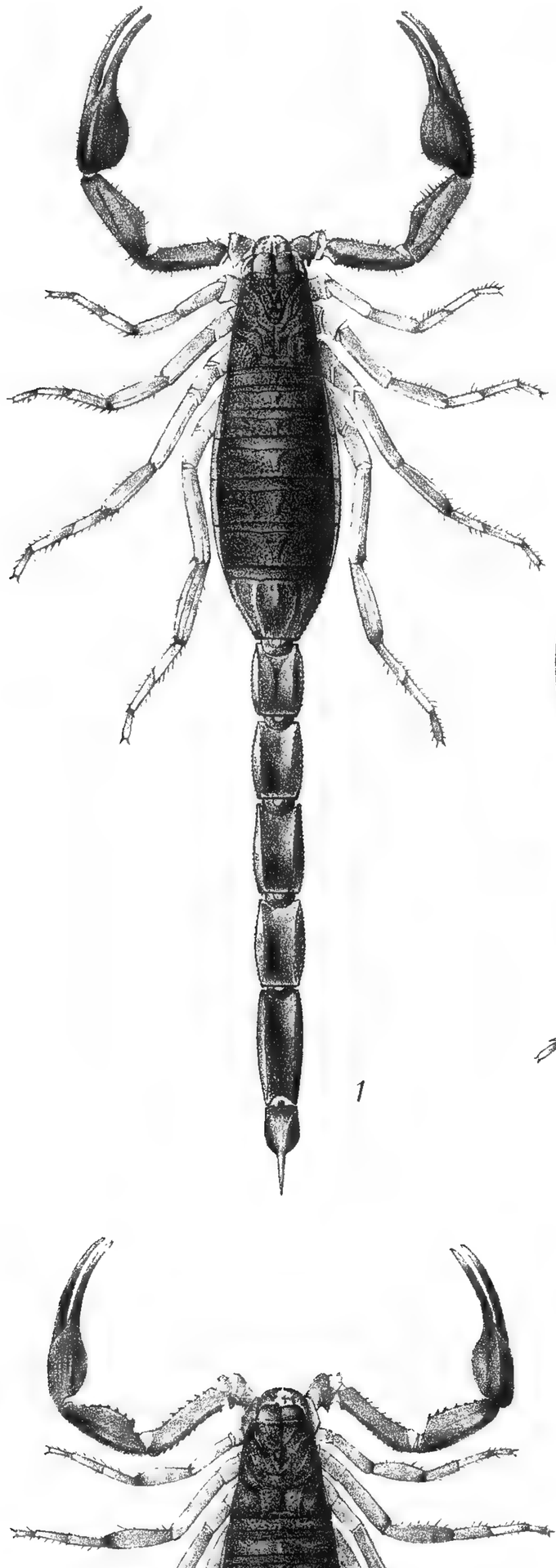
Fig. 1. *Centruroides margaritatus* (Gerv.), ♀, nat. size: 1 *a*, sternum of cephalothorax (*st.*), genital operculum (*g.*), pectine (*pect.*), and first abdominal sternum (*st.abd.*) showing the shallow grooves running obliquely inwards and forwards from the stigmata (to compare with the same structures in *Rhopalurus*, Plate VIII. fig. 5 *a*); 1 *b*, movable finger of chela to show dentition; 1 *c*, tarsus of fourth leg from the outer side to show the branched anterior pedal spur (*sp.*); 1 *d*, lower view of the same to show the two pedal spurs (*sp.*); 1 *e*, lateral view of extremity of tail.

2. *Centruroides margaritatus* (Gerv.), ♂, nat. size: 2 *a*, movable finger to show dentition; 2 *b*, lateral view of extremity of tail.

3. *Centruroides gracilis*, Latr., ♀, nat. size, from Honduras: 3 *a*, lateral view of tail.

4. *Centruroides gracilis*, Latr., ♂, nat. size, from Honduras: 4 *a*, lateral view of extremity of tail.

5. *Centruroides bicolor*, Poc., ♂, nat. size, from Pozo Azul de Pirris, Costa Rica: 5 *a*, lateral view of extremity of tail.



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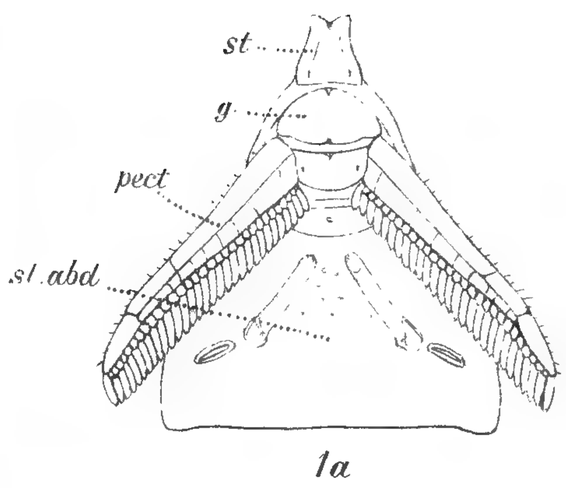

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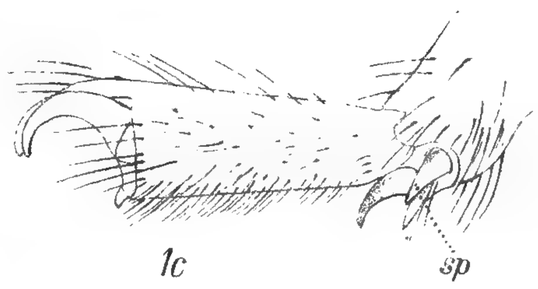

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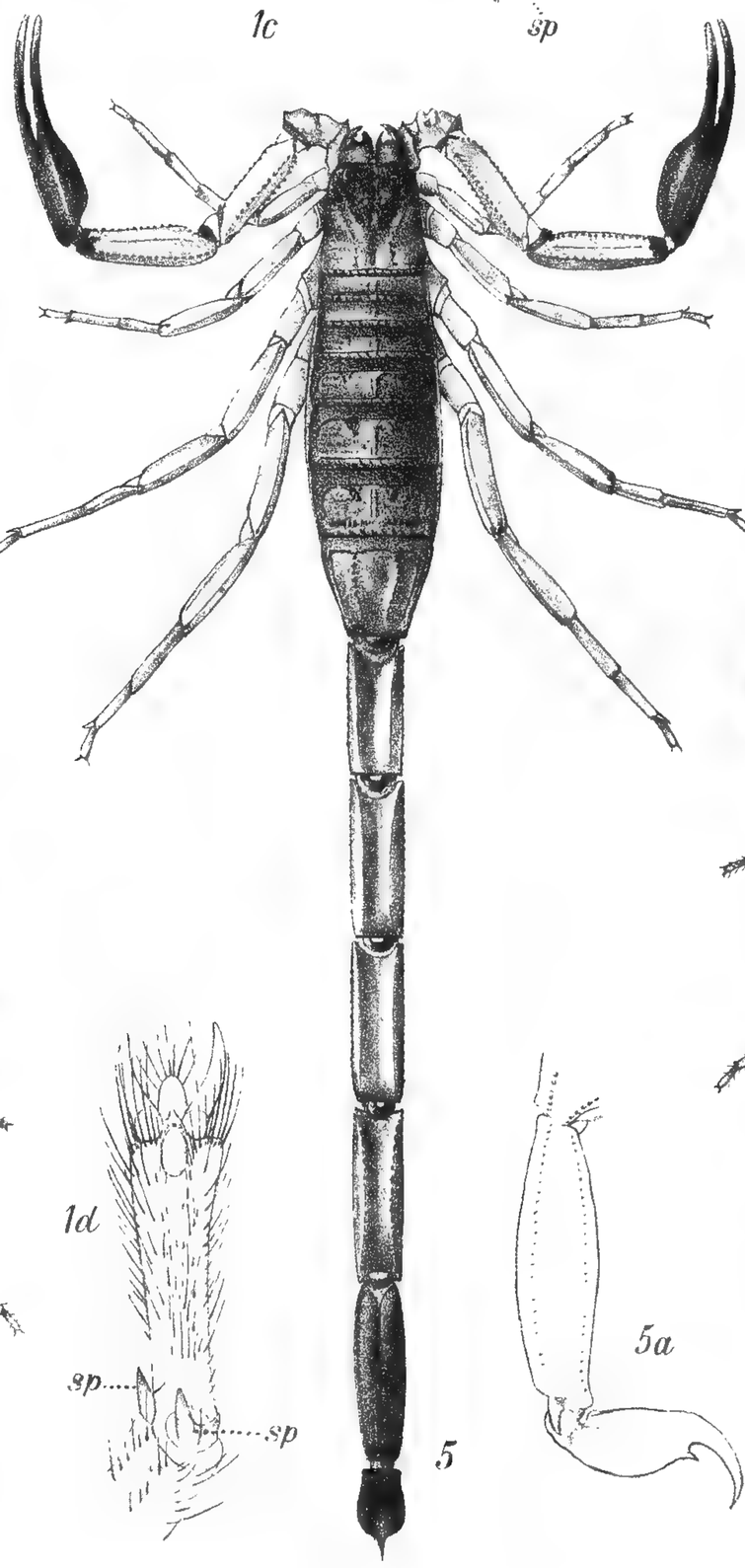
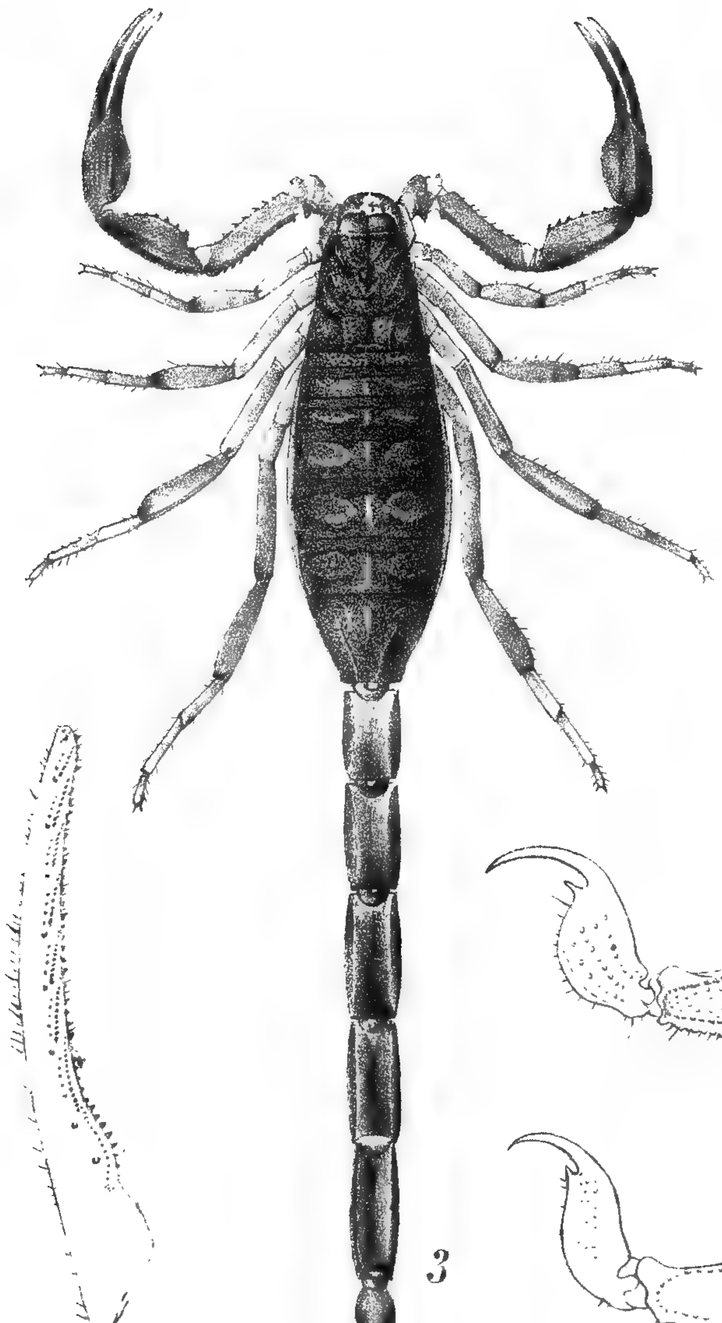
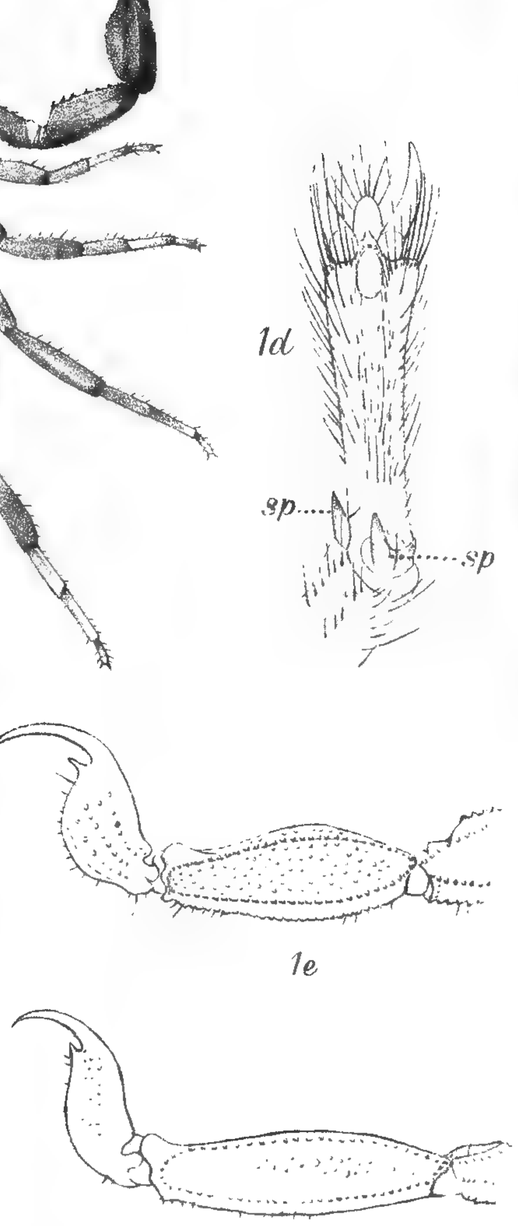




1b

1d

1e

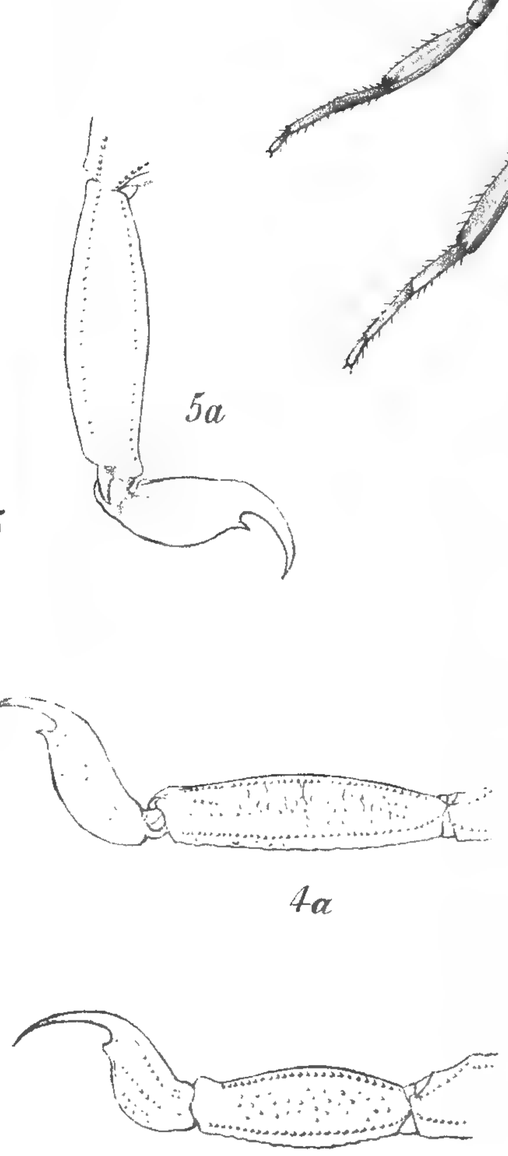


3

2b

5

4a



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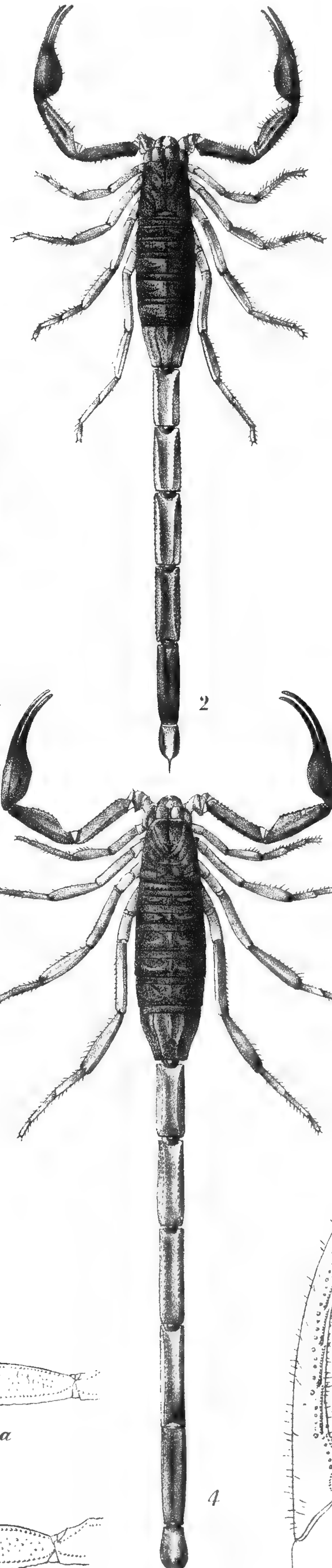

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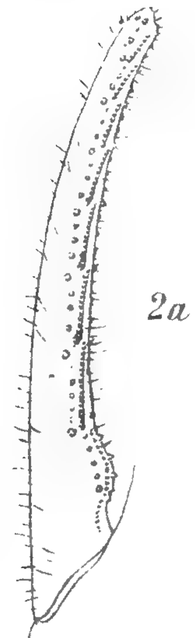


2a

1,1a-e CENTRUROIDES MARGARITATUS.
2,2a,b " "
3,3a " GRACILIS.

4,4a CENTRUROIDES GRACILIS.
5,5a " BICOLOR.

A.T.Hollick, del. J.Green, lith.

Mintern Bros. imp.

PLATE VIII.

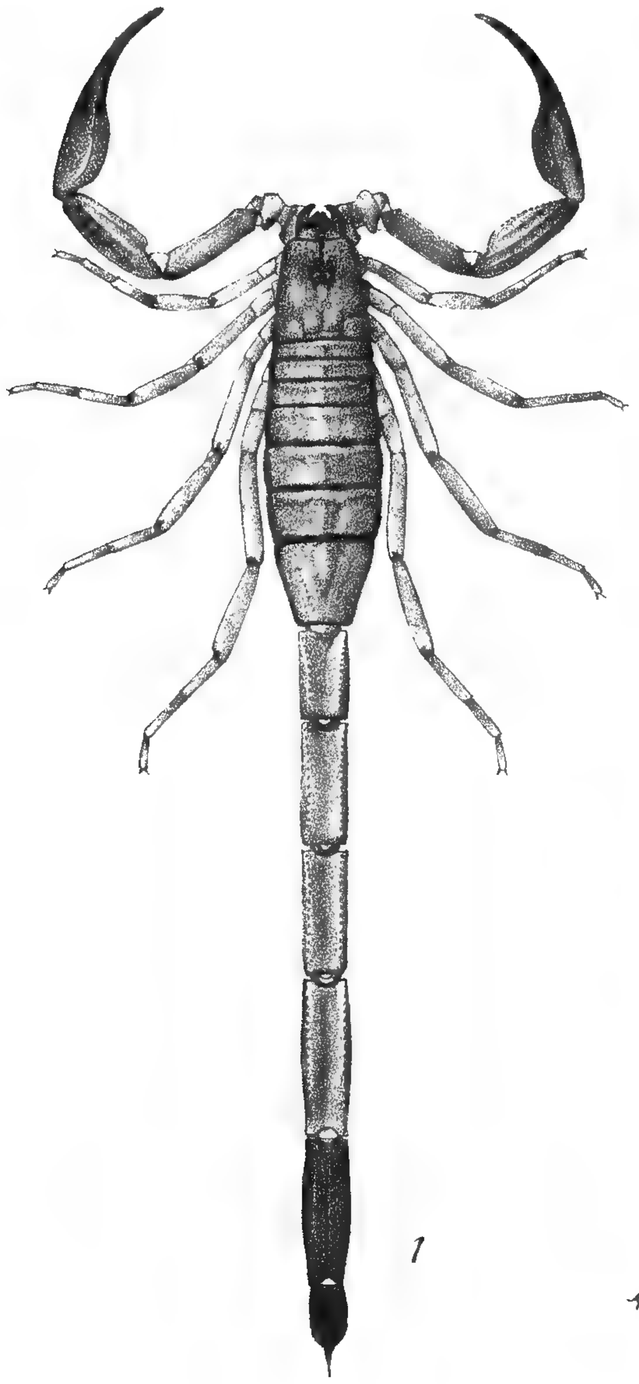
Fig. 1. *Centruroides limbatus*, Poc., ♂, nat. size, typical example from Sipurio in Talamanca: 1 *a*, carapace.

2. *Centruroides nigrescens*, Poc., ♀, nat. size, from Xautipa, Mexico: 2 *a*, lateral view of tail.

3. *Centruroides nigrescens*, Poc., ♂, nat. size, typical example from Xautipa, Mexico: 3 *a*, lateral view of posterior end of tail.

4. *Centruroides fulvipes*, Poc., ♀, nat. size, typical example from Xautipa, Mexico: 4 *a*, movable digit of chela, to show the nine median rows of teeth characteristic of the *gracilis*-group of *Centruroides*.

5. *Rhopalurus junceus*, Herbst, ♀, nat. size, specimen ticketed "Mexico" in Mus. Brit.: 5 *a*, sternum of cephalothorax (*st.*), genital operculum (*g.*), pectines (*pect.*), and first abdominal sternum (*st.abd.*) showing the deep grooves running forwards from the inner extremity of the stigmata (to compare with the same structures in *Centruroides*, Plate VII. fig. 1 *a*).



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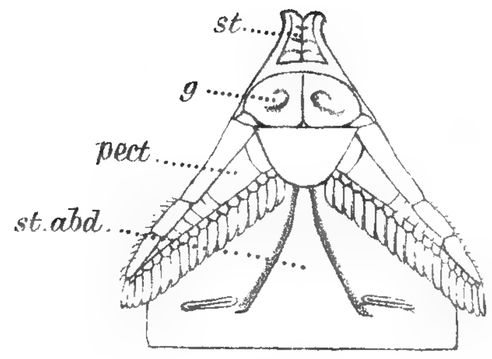

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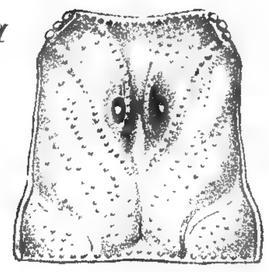

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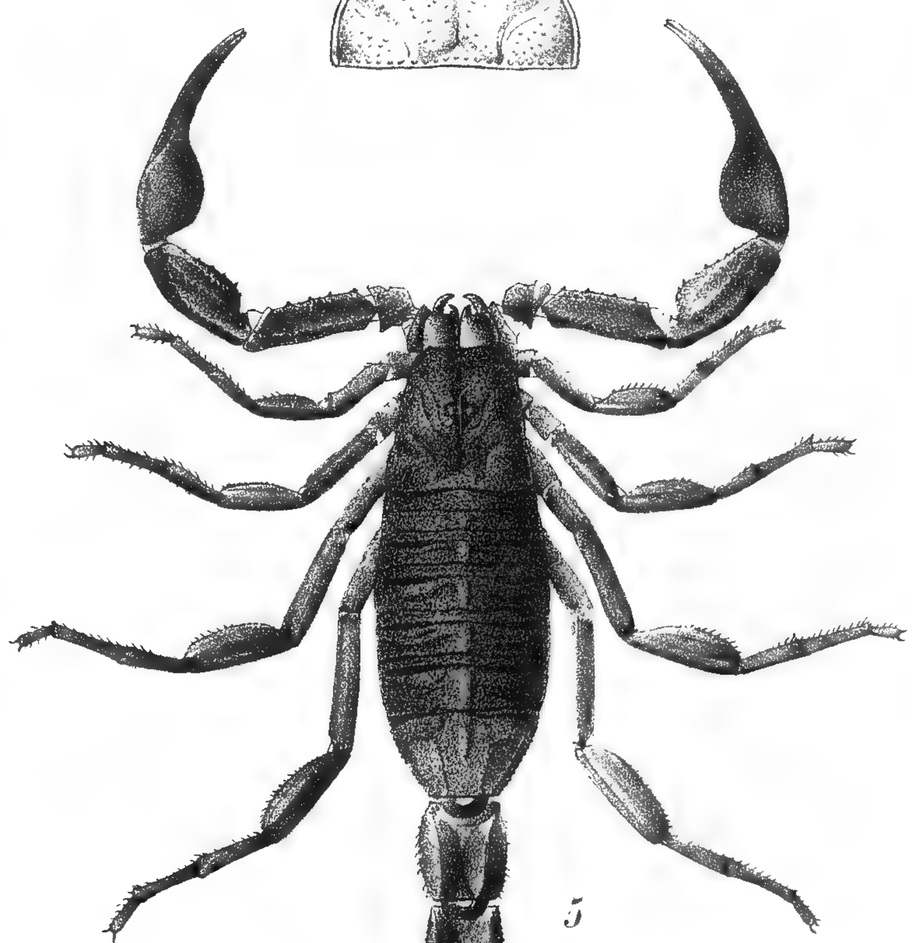

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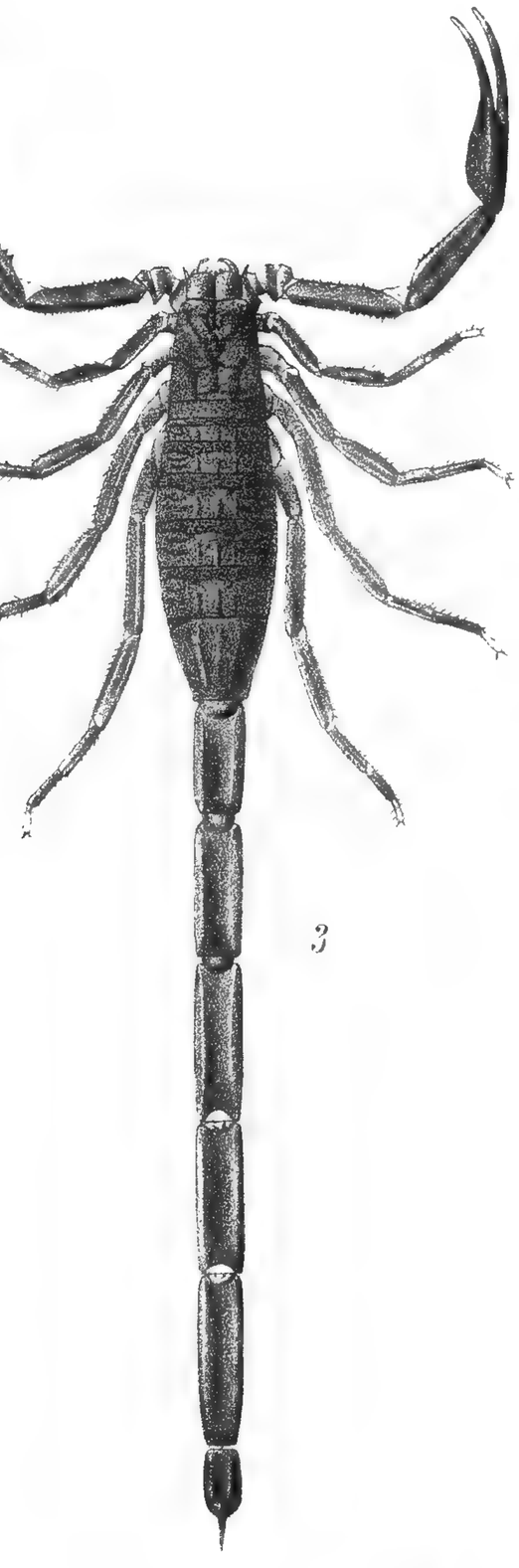

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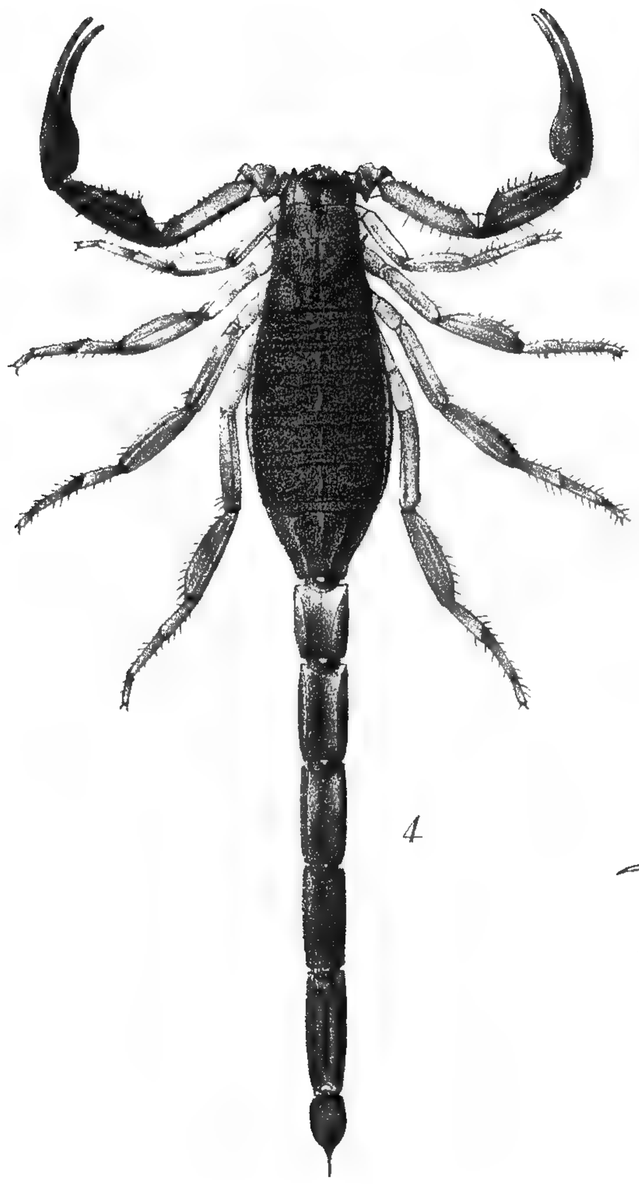

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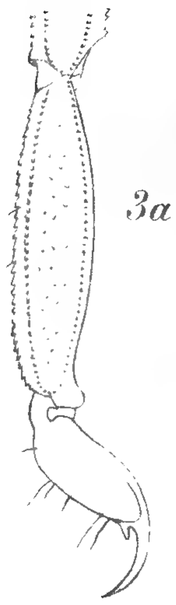

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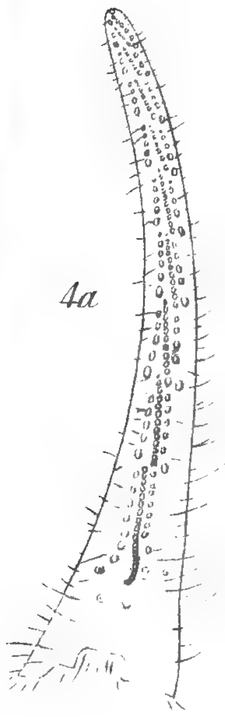

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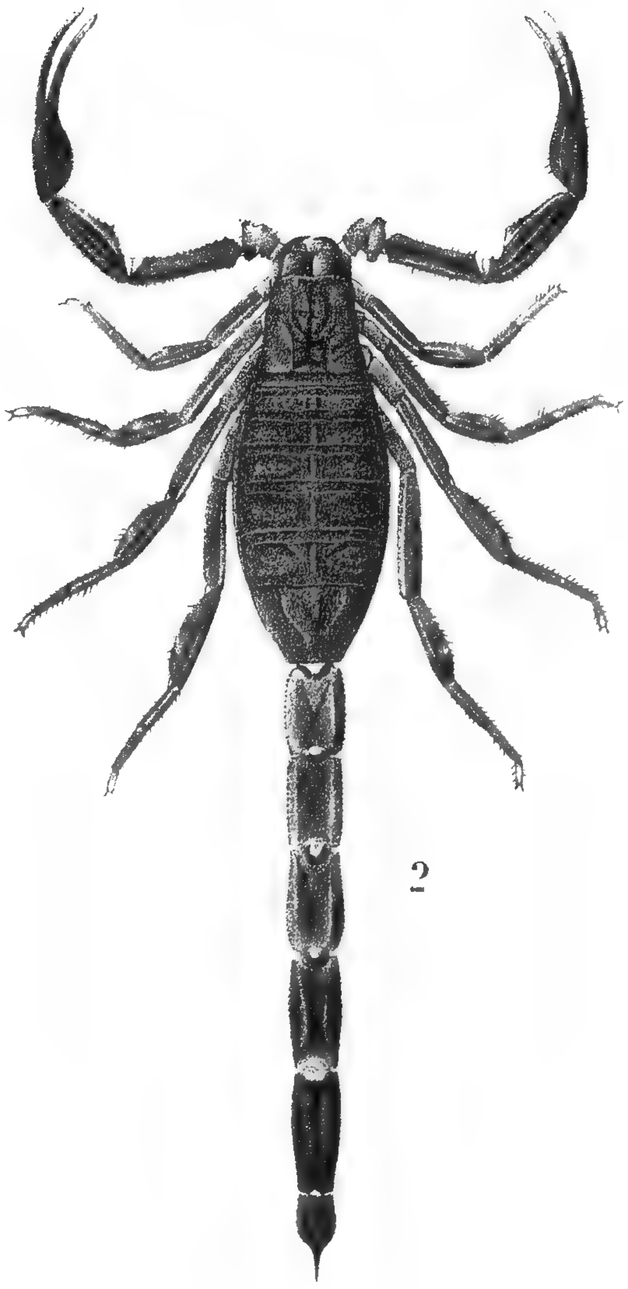

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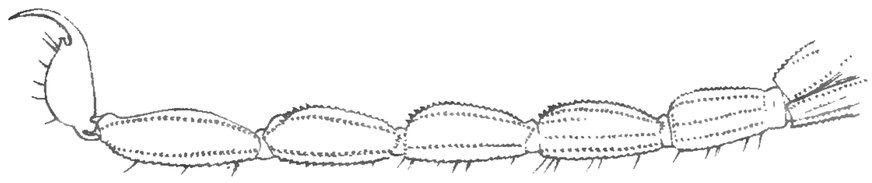


2a

1,1a CENTRUROIDES LIMBATUS.
2,2a " NIGRESCENS.
3,3a " "

4,4a CENTRUROIDES FULVIPES.
5,5a RHOPALURUS JUNCEUS.

A.T.Hollick, del. J.Green, lith.

Mintern Bros. imp

PLATE IX.

Fig. 1. *Rhopalurus junceus,* Herbst, ♂, nat. size, specimen ticketed Mexico in Mus. Brit.: 1 *a,* lateral surface of tail.

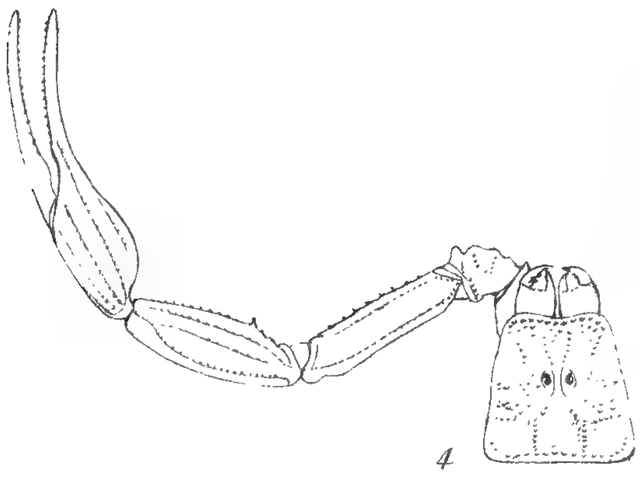
2. *Tityus cambridgei,* Poc., subsp. *championi,* Poc., ♂, nat. size, specimen from Darien. (The second leg on the left side is abnormal.)

3. *Tityus cambridgei,* Poc., subsp. *championi,* Poc., nat. size, type-specimen of *T. championi,* from Bugaba, to show the difference in colour due to immaturity: 3 *a,* lateral surface of the tail.

4. *Tityus festæ,* Bor., ♂, carapace and chela of left side of type-specimen from Darien, × $1\frac{1}{2}$.

5. *Tityus androcottoides,* Karsch, carapace and left chela of ♀; 5 *a,* inferior surface of tail of same; 5 *b,* carapace and right chela of ♂; 5 *c,* lateral surface of tail of the same, all × $1\frac{1}{2}$. Specimens from Demerara.

6. *Tityus crassimanus,* Thor., ♂, nat. size, specimen without locality in Mus. Brit.: 6 *a,* movable finger, to show dentition characteristic of the genus *Tityus*; 6 *b,* lower surface of tail; 6 *c,* lateral surface of tail.



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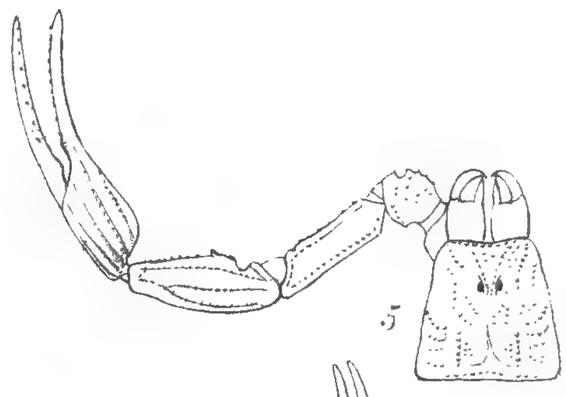

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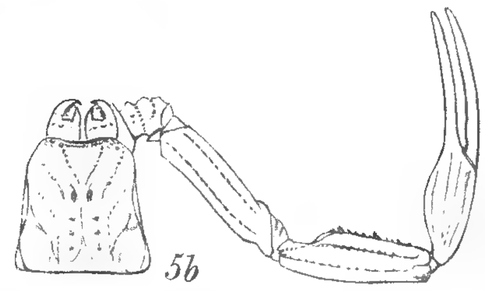

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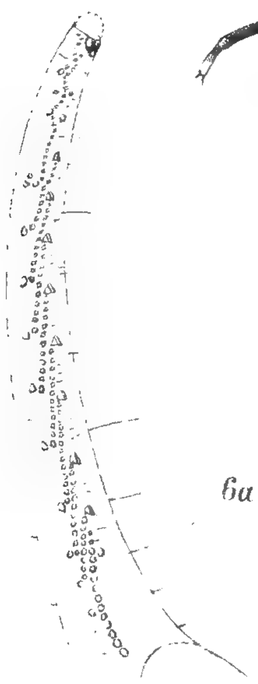
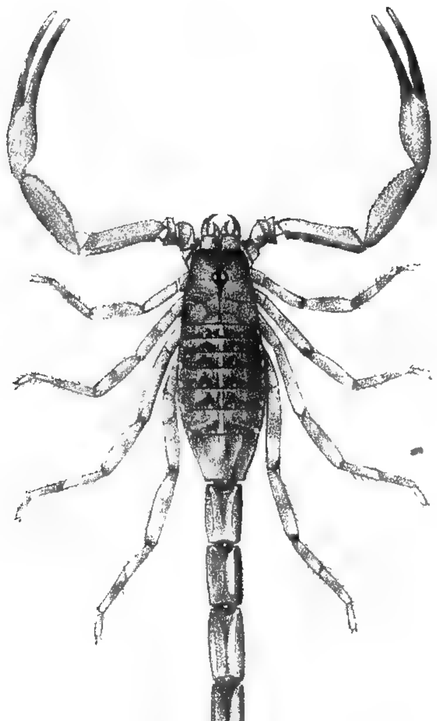


6a



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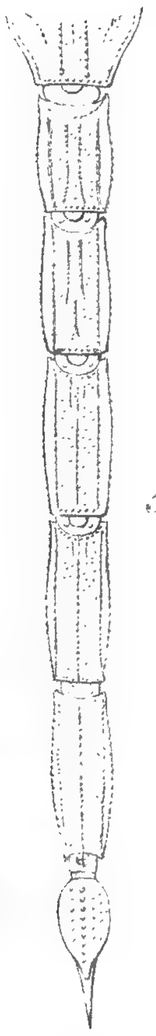
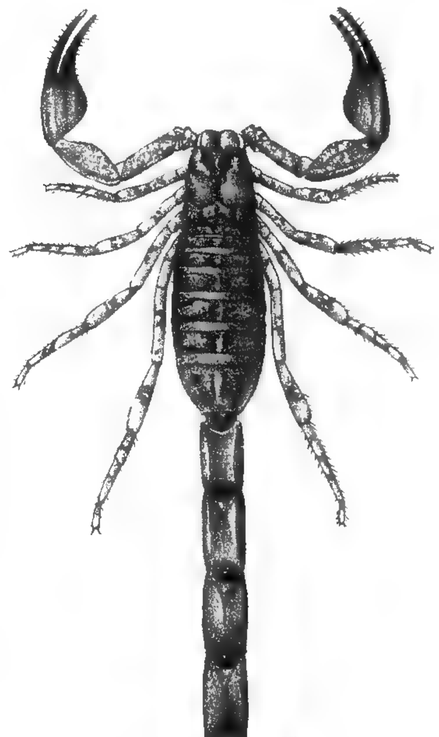


5a



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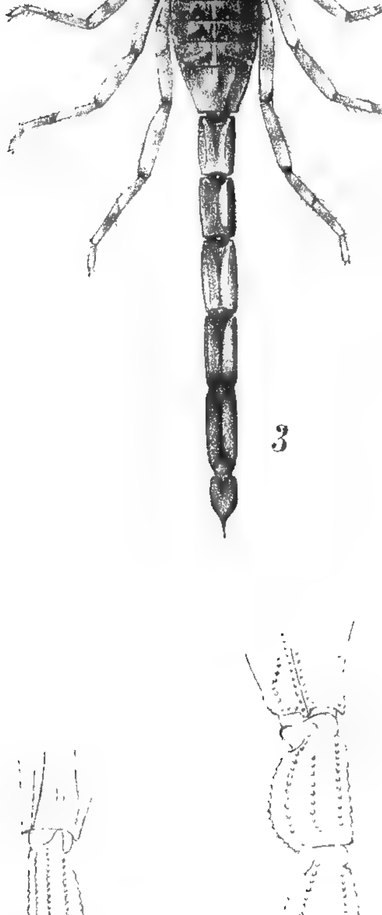

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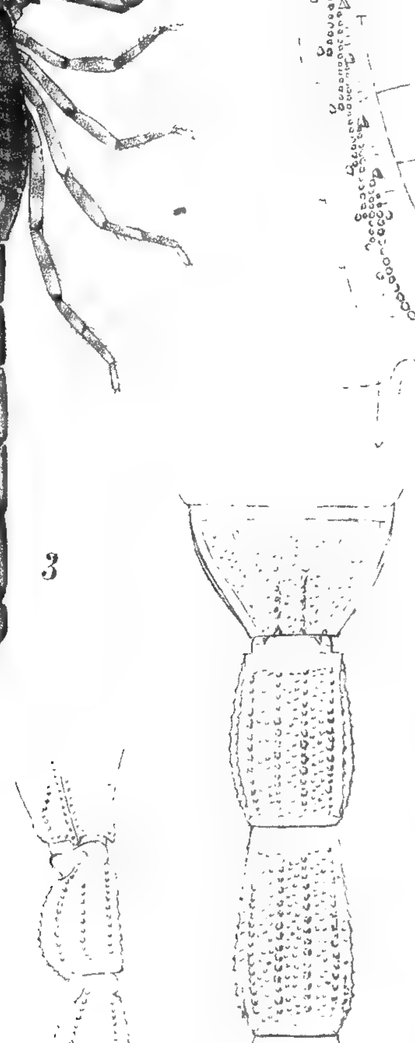

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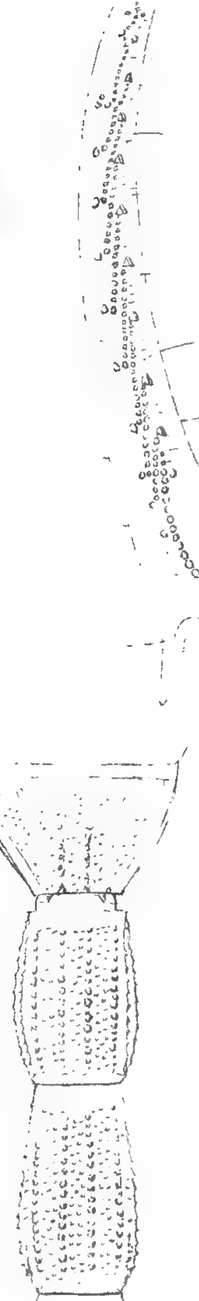
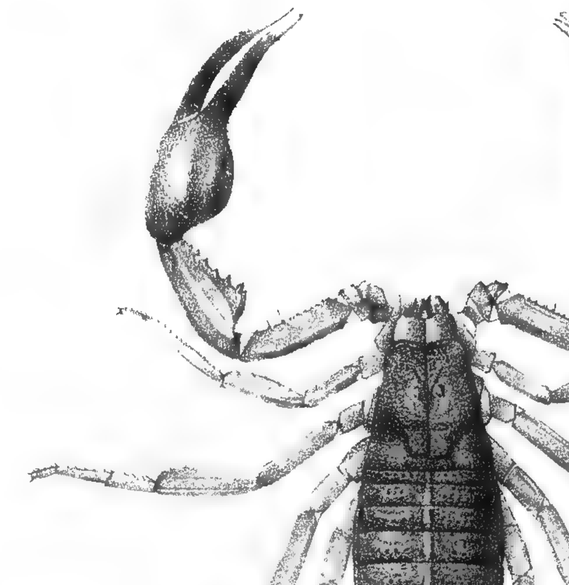


6b



1

6c

1a

1,1a RHOPALURUS JUNCEUS.
2 TITYUS CAMBRIDGEI, *subsp.* CHAMPIONI.
3,3a " " "*(immature)*
4 TITYUS FESTÆ
5,5a-c " ANDROCOTTOIDES.
6,6a-c " CRASSIMANUS.

A.T. Hollick, del. J. Green lith.
Mintern Bros. imp.

PLATE X.

Fig. 1. *Mastigoproctus giganteus*, Luc., ♀, nat. size, typical form from Atoyac: 1 *a*, anterior three sternal plates of abdomen.

2. *Mastigoproctus giganteus*, Luc., ♂, nat. size, typical form from Atoyac: 2 *a*, anterior three sterna of abdomen.

3. *Mastigoproctus giganteus*, Luc., subsp. *mexicanus*, Butl., anterior end of carapace and left chela of type-specimen.

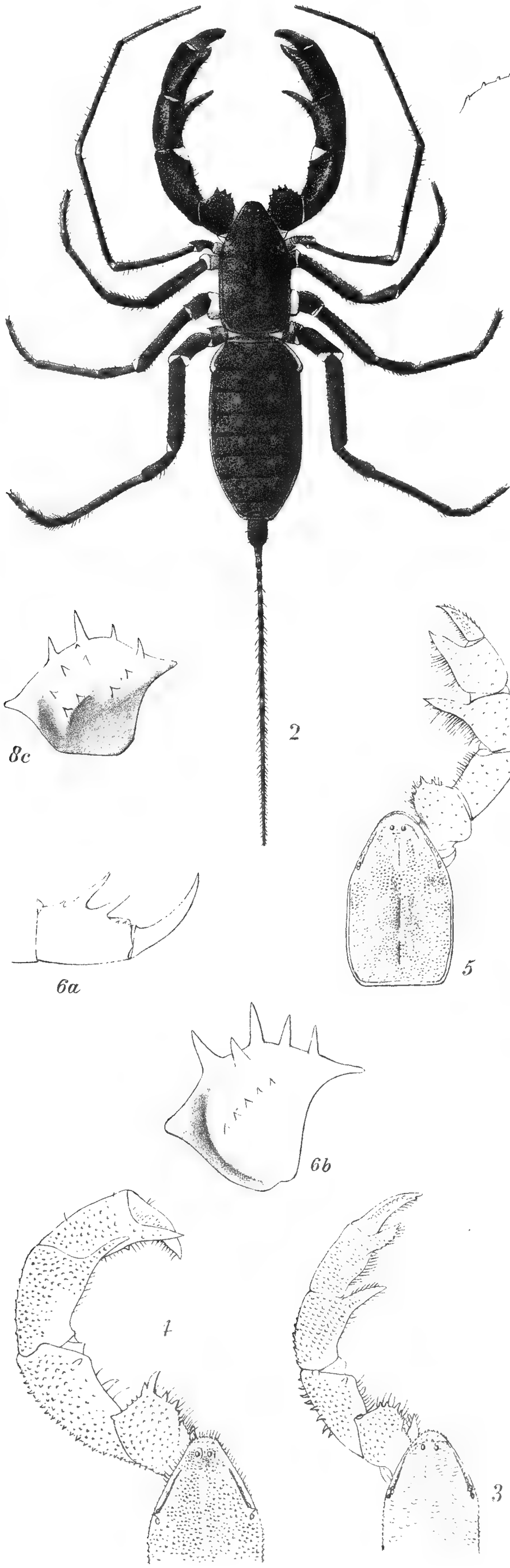
4. *Mastigoproctus giganteus*, Luc., subsp. *scabrosus*, Poc., anterior end of carapace and left chela of type-specimen from Oaxaca.

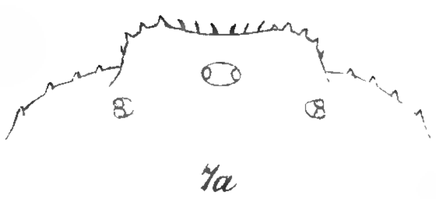
5. *Mastigoproctus liochirus*, Poc., carapace and right chela of type-specimen from Guatemala.

6. *Phrynus barbadensis*, Poc., ♂, carapace and right chela; 6 *a*, dorsal view of the fifth and sixth segments (hand and movable finger) of the chela; 6 *b*, trochanter of chela from above, to show the large spine in the middle of its anterior surface. Figures taken from type-specimen from Barbados.

7. *Phrynus parvulus*, sp. n., ♂, carapace; 7 *a*, anterior end of carapace, to show the shape of the frontal portion; 7 *b*, anterior sternal plates of abdomen, to show the size and shape of the first, second, and third sterna.

8. *Phrynus operculatus*, sp. n., ♂, carapace and chela; 8 *a*, anterior end of carapace, to show shape of frontal area; 8 *b*, anterior sternal plates of abdomen, to show size and shape of the first three sterna; 8 *c*, trochanter of right chela from above, to show the absence of large spine from its anterior surface.





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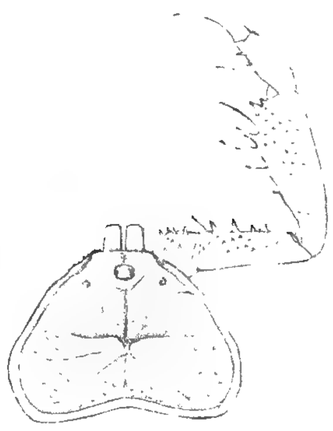

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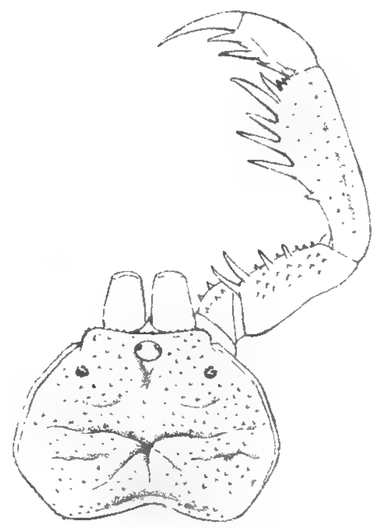

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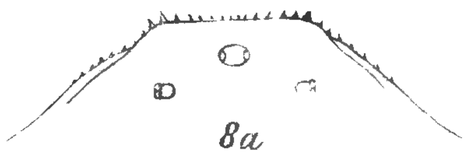

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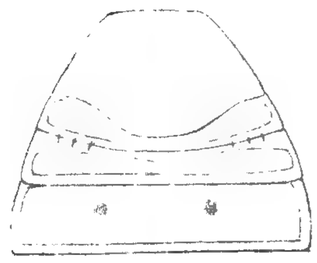

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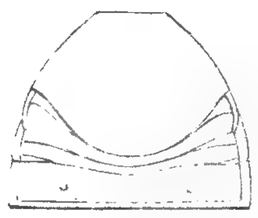

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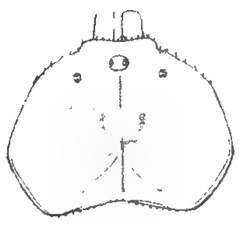

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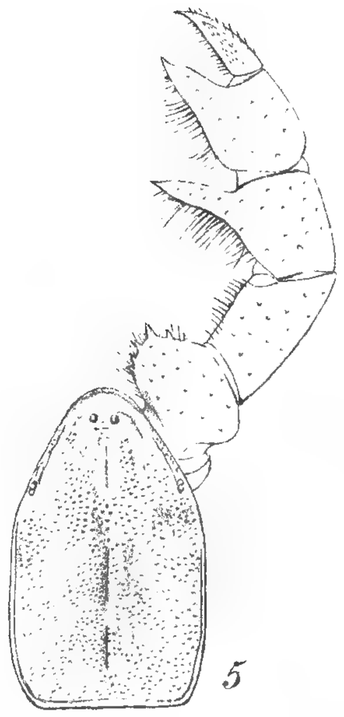
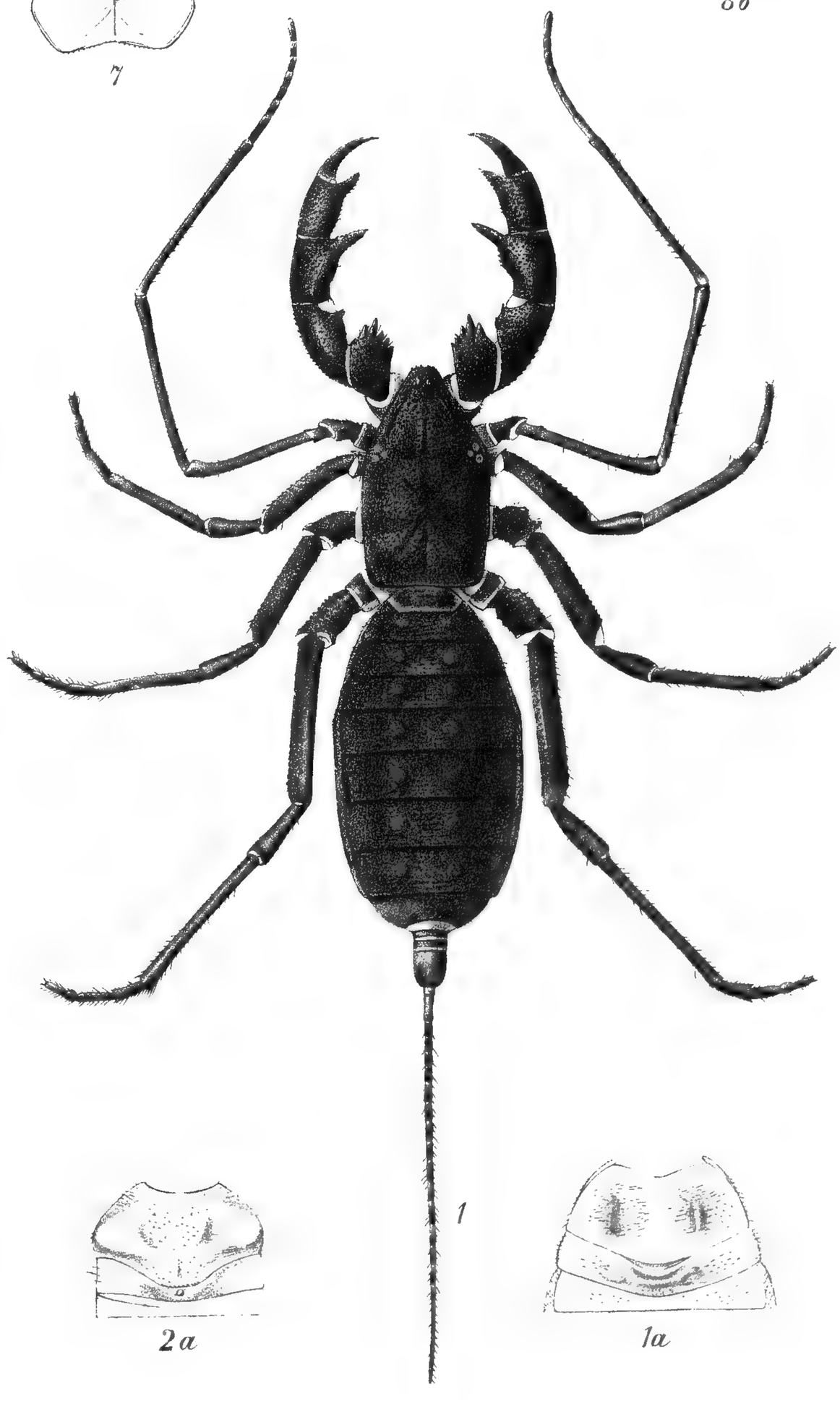
8c



2

6a

6b



1

3

2a

1a

1,1a MASTIGOPROCTUS GIGANTEUS.
2,2a " "
3 " " *subsp.* MEXICANUS.
4 " " *subsp.* SCABROSUS.
5 MASTIGOPROCTUS LIOCHIRUS.
6,6a,b PHRYNUS BARBADENSIS.
7, 7a,b " PARVULUS.
8, 8a-c " OPERCULATUS.

A.T.Hollick, del. J.Green lith.

Mintern Bros. imp.

PLATE XI.

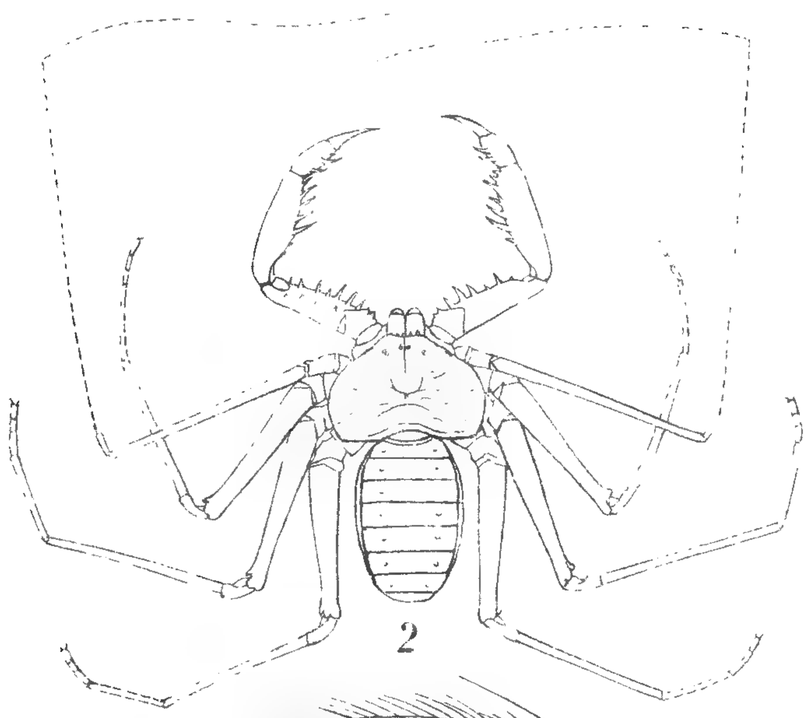
Fig. 1. *Phrynus whitei,* Gerv., nat. size, figure taken from type-specimen: 1 *a,* carapace and chela; 1 *b,* left chela from the underside; 1 *c,* outer side of hand of left chela, showing the two long spines on the upper edge and the one long spine on the under.

2. *Hemiphrynus aztecus,* Poc., nat. size, type-specimen from Tuxtla: 2 *a,* carapace and chela; 2 *b,* left chela from underside.

3. *Hemiphrynus raptator,* Poc., ♂, nat. size, type-specimen from Teapa: 3 *a,* carapace and chela; 3 *b,* anterior portion of carapace with mandibles; 3 *c,* left chela from underside; 3 *d,* trochanter of right chela from above; 3 *e,* hand and claw (protarsus and tarsus) of right chela from above; 3 *f,* sternal surface of cephalothorax and of anterior four segments of abdomen; 3 *g,* extremity of tarsus of fourth leg.

4. *Hemiphrynus lævifrons,* Poc., anterior portion of carapace with mandibles: 4 *a,* trochanter of right chela from above; 4 *b,* hand and claw (protarsus and tarsus) of right chela from above.

5. *Acanthophrynus spinifrons,* Poc., nat. size, type-specimen from Ciudad in Durango: 5 *a,* carapace; 5 *b,* left chela from above; 5 *c,* ditto from below; 5 *d,* trochanter and base of femur of the same, to show supernumerary spine; 5 *e,* tarsus of fourth leg.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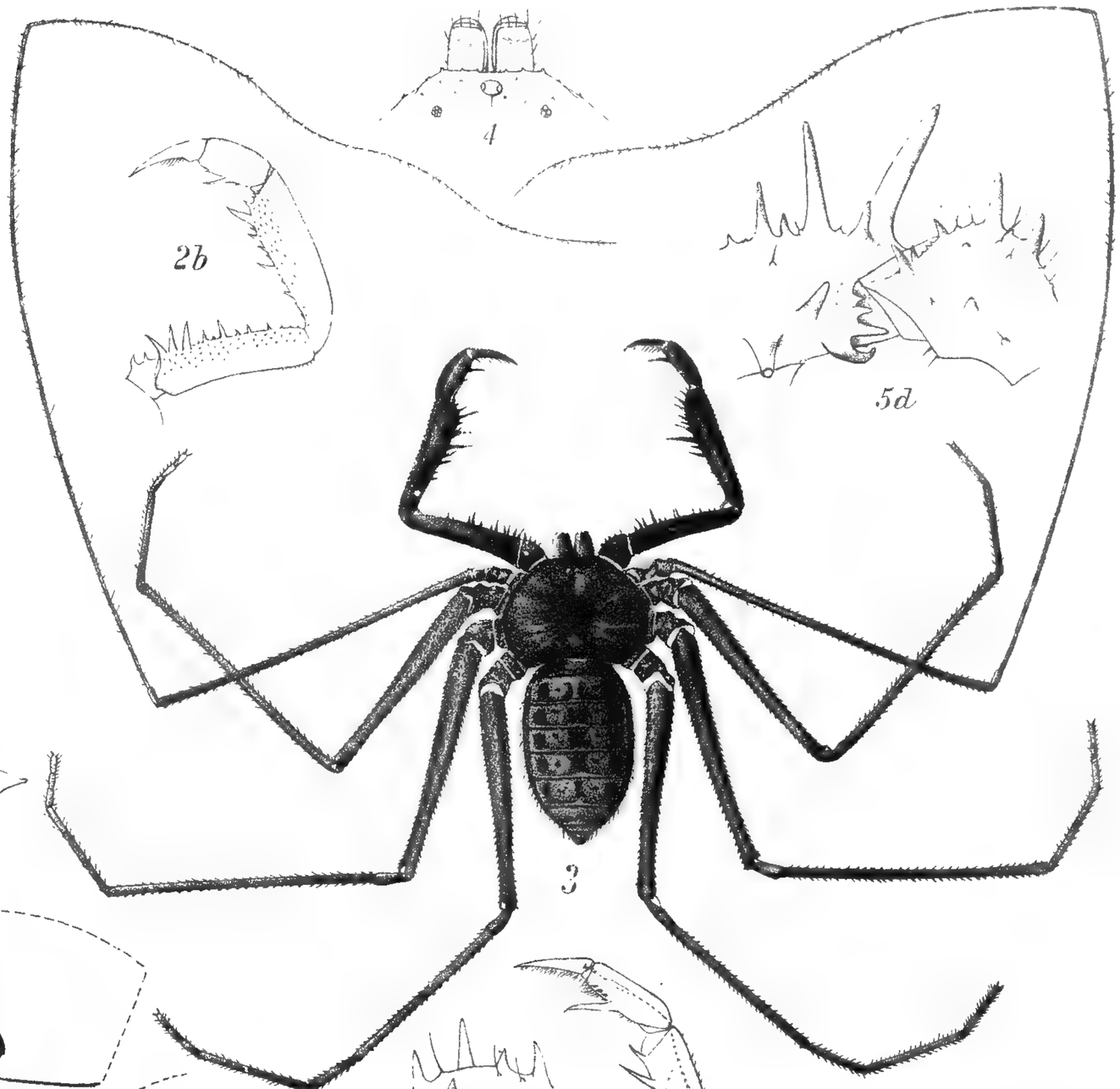
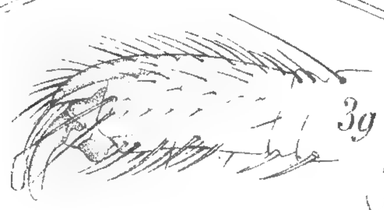

3

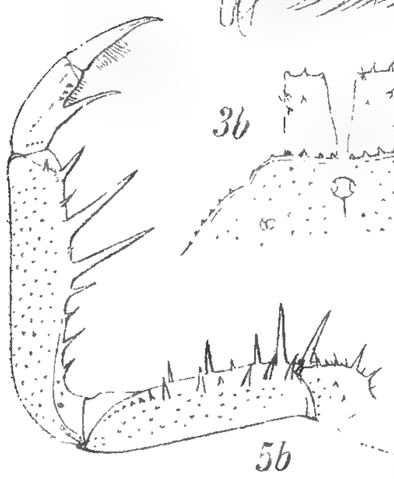
4

2b

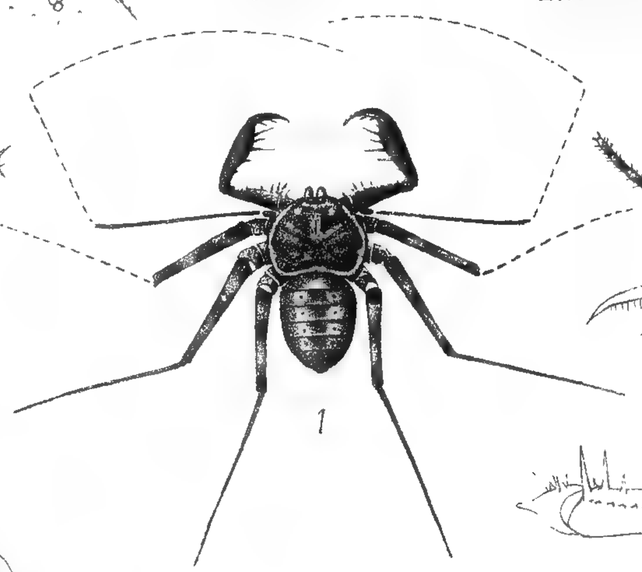
5d


3g

3d


3b

5b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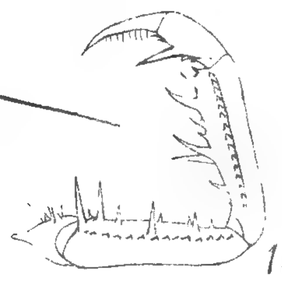
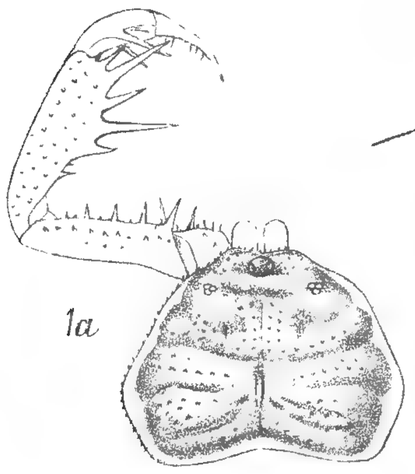

1b

4a
5c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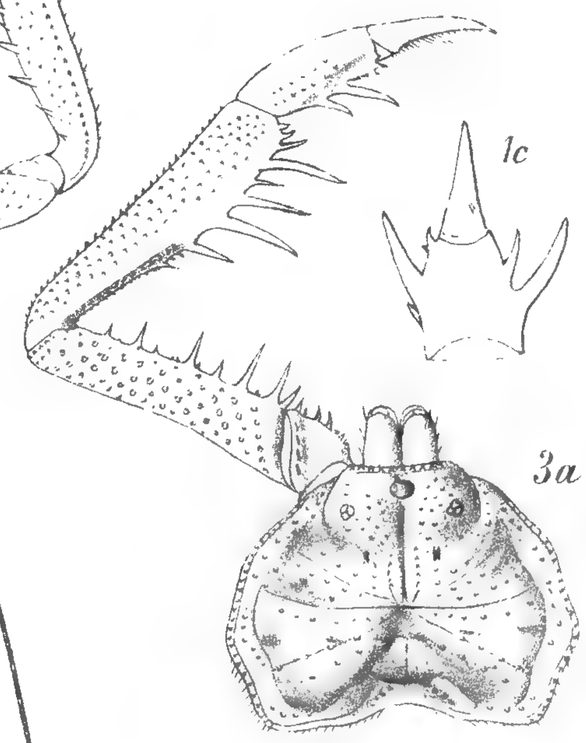
1c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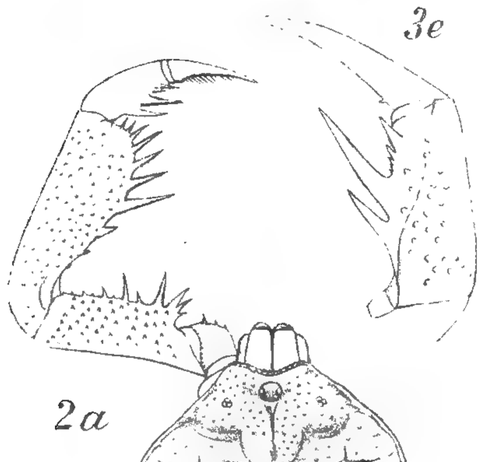
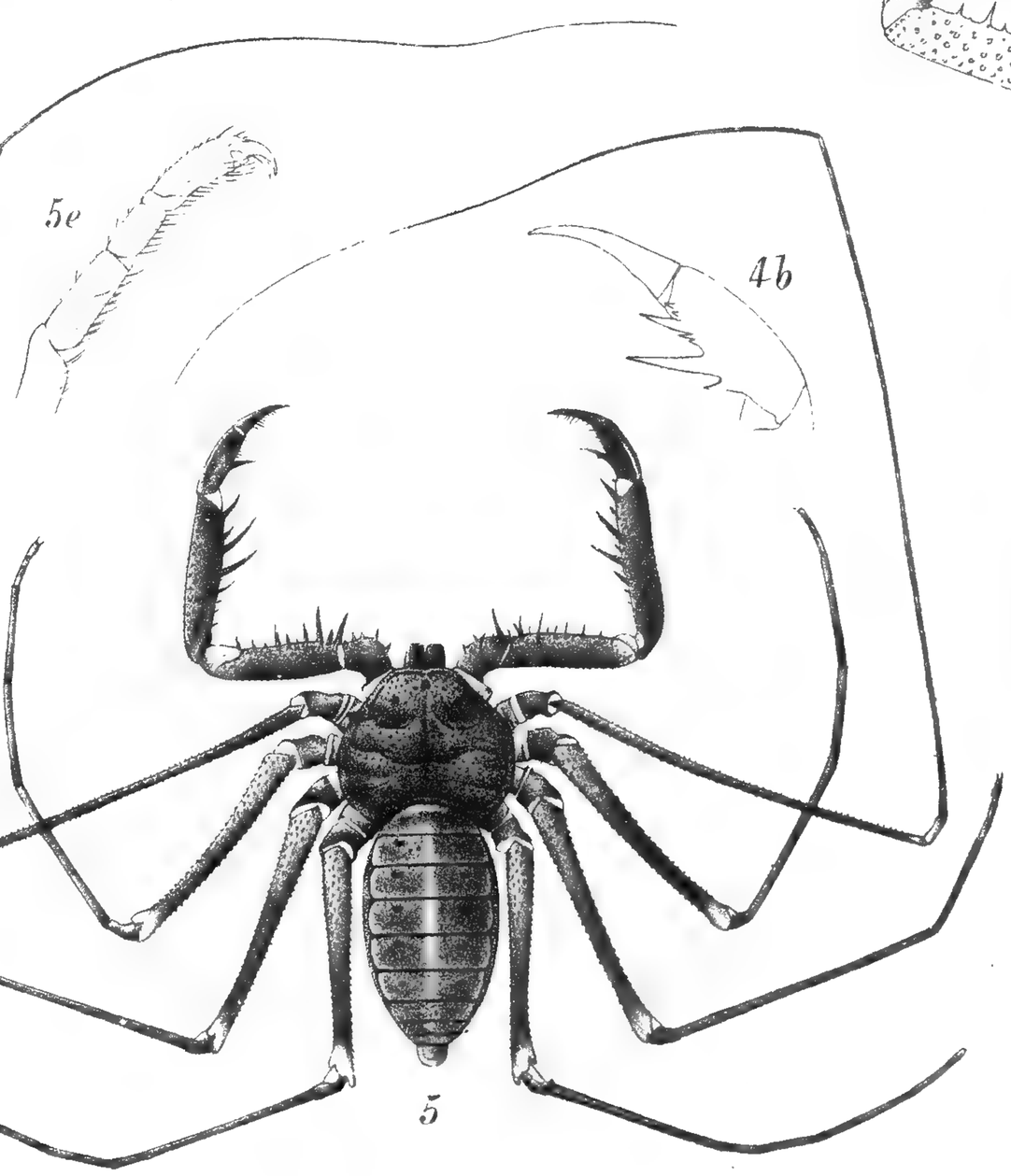
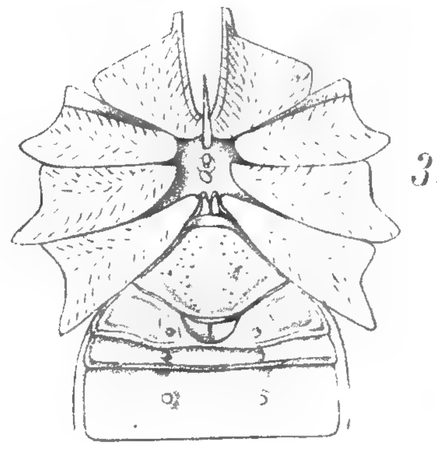
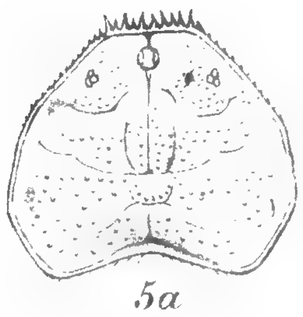

2a
3e


5
5e
4b


3f

3c


5a

1, 1a-c PHRYNUS WHITEI.
2, 2a,b HEMIPHRYNUS AZTECUS.
3, 3a-g HEMIPHRYNUS RAPTATOR.
4, 4a,b " LÆVIFRONS
5, 5a-e ACANTHOPHRYNUS SPINIFRONS

A.T.Hollick del. J.Green lith. Mintern Bros. imp

PLATE XII.

Fig. 1. *Heterophrynus chiracanthus,* Gerv., carapace and chela of type-specimen from Demerara, × 1½; 1 *a,* base of chela from the underside showing the apophysis (*ap.*) on the trochanter.

2. *Eremobates aztecus,* sp. n., ♀, × 1½, from Guanajuato: 2 *a,* jaws of the right mandible from the outer side.

3. *Eremobates aztecus,* sp. n., ♂, × 1½, figure of type-specimen from Guanajuato: 3 *a,* jaws of right mandible from outer side.

4. *Eremobates toltecus,* Poc., ♂, inner aspect of the right mandible, with most of the hairs stripped off.

5. *Eremobates cinerascens,* Koch, ♂, jaws of mandible (after Kraepelin).

6. *Eremobates elongatus,* Koch, ♂, jaws of mandible (after Kraepelin).

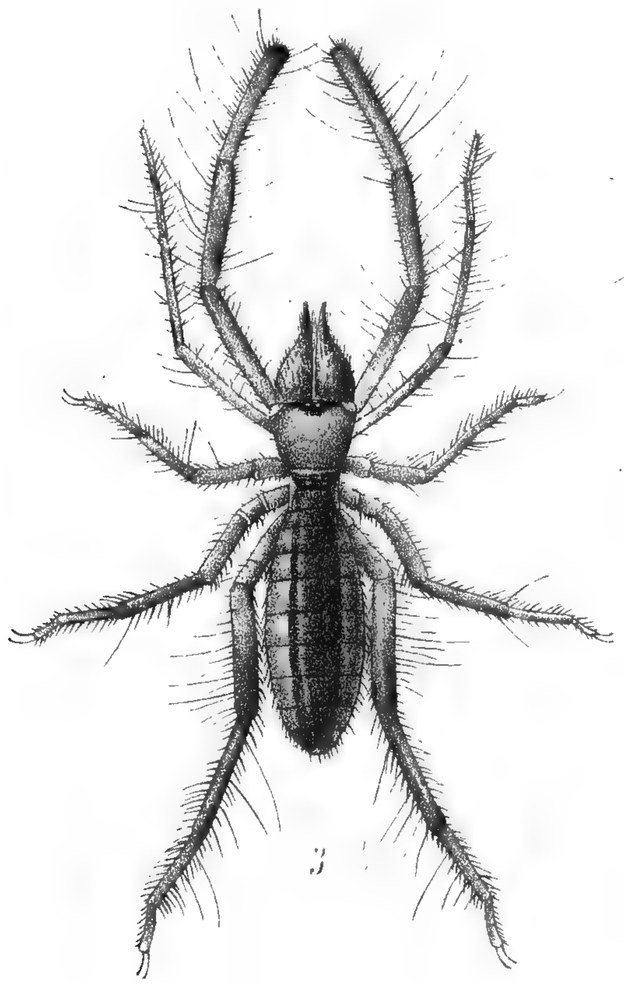
7. *Eremobates formidabilis,* Sim., ♂, jaws of mandible (after Kraepelin).

8. *Ammotrecha stolli,* Poc., ♀, × 2, type-specimen from Retalhuleu: 8 *a,* outer side of jaws of right mandible; 8 *b,* tarsus of fourth leg from the outer side.

9. *Ammotrecha picta,* sp. n., ♀, × 2, type-specimen from Guatemala: 9 *a,* upper jaw of right mandible from the inner side.

10. *Hemiblossia vittata,* sp. n., ♀, × 3, type-specimen from Guatemala: 10 *a,* ocular tubercle and anterior border of head-shield; 10 *b,* jaws of right mandible from the outer side; 10 *c,* posterior side of extremity of second leg; 10 *d,* anterior side of extremity of fourth leg.

11. *Dæsia præcox,* Koch, inner aspect of right mandible (after Kraepelin).

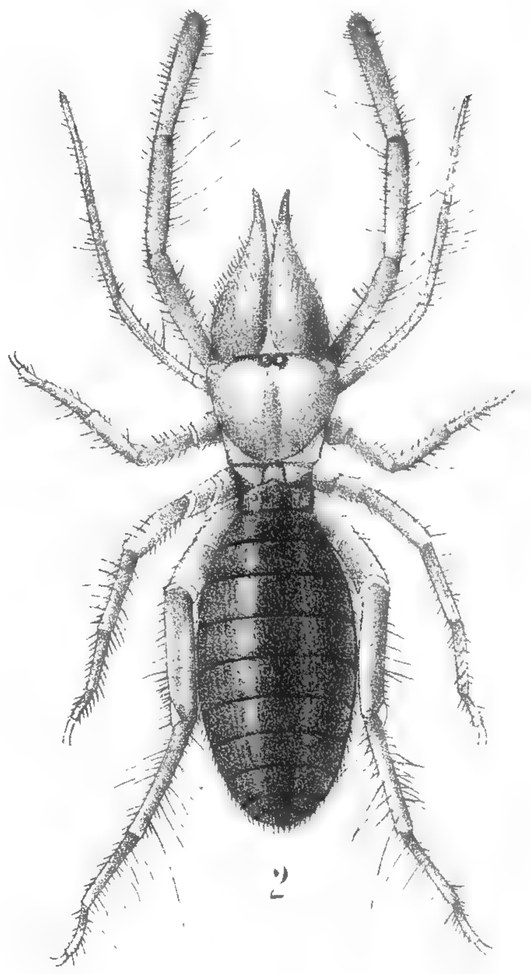


3

10d

10c

8b



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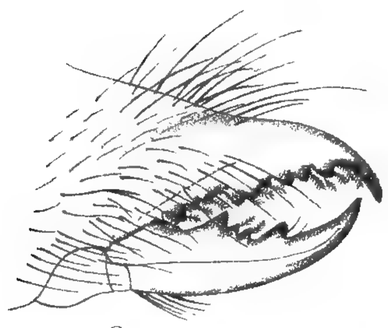
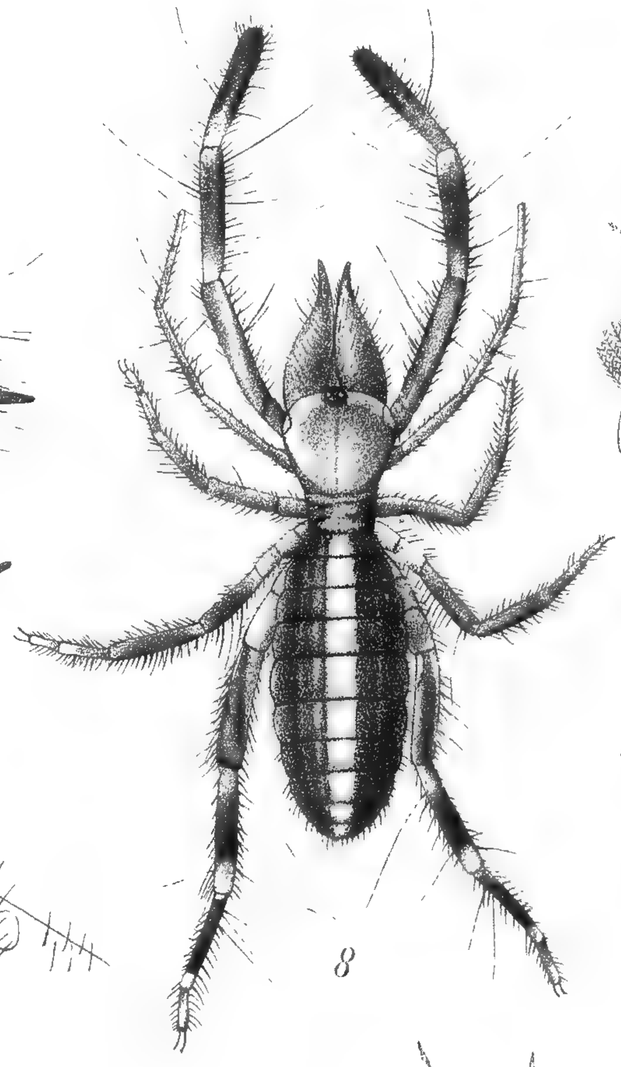


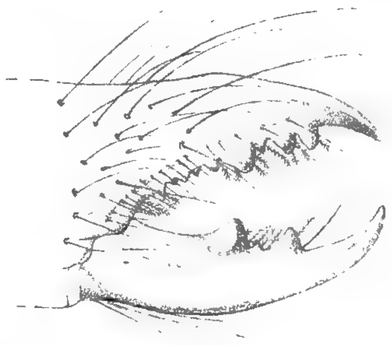
2a

3a



8

9a



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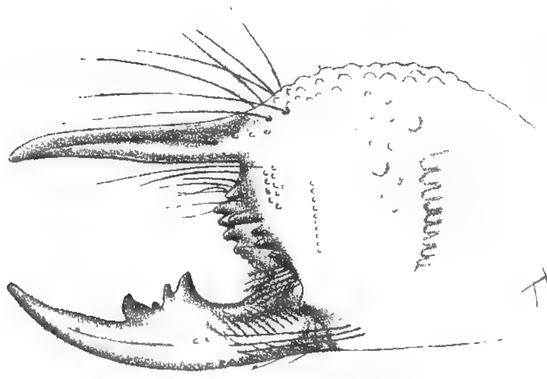

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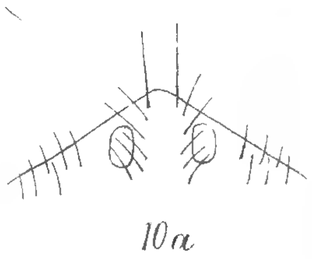
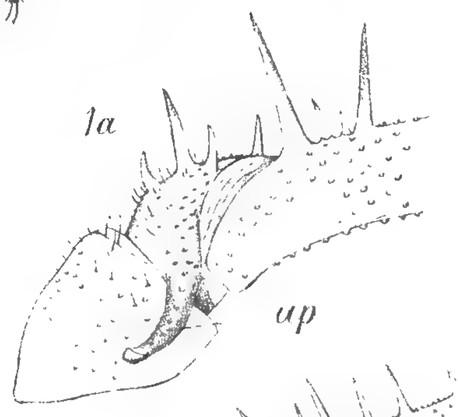


10a

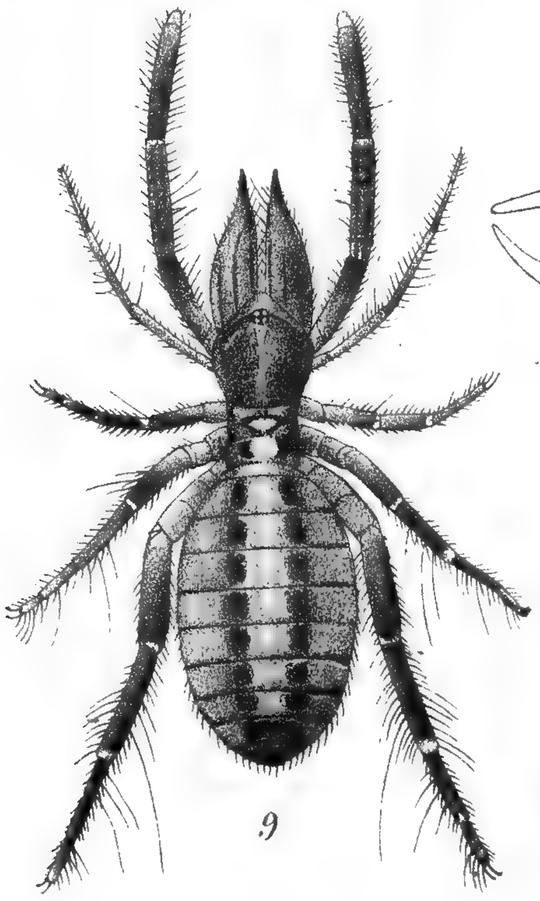
5



1a

11

7



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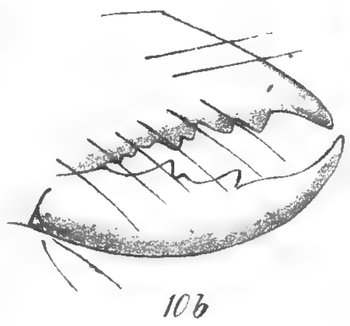

10b

1

6

10

1, 1a. HETEROPHRYNUS CHIRACANTHUS.
2, 2a. EREMOBATES AZTECUS.
3, 3a. " "
4 " TOLTECUS.
5 EREMOBATES CINERASCENS.
6 " ELONGATUS.
7 " FORMIDABILIS.
8, 8 a, b AMMOTRECHA STOLLI.
9, 9 a " PICTA.
10, 10 a-d HEMIBLOSSIA VITTATA.
11 DÆSIA PRÆCOX.

A.T.Hollick, del. J.Green lith.

Mintern Bros imp

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